

JPRS-UEE-85-001

9 January 1985

USSR Report

ELECTRONICS AND ELECTRICAL ENGINEERING

FBIS

FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service (NTIS), Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semimonthly by the NTIS, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

Soviet books and journal articles displaying a copyright notice are reproduced and sold by NTIS with permission of the copyright agency of the Soviet Union. Permission for further reproduction must be obtained from copyright owner.

9 January 1985

USSR REPORT
ELECTRONICS AND ELECTRICAL ENGINEERING

CONTENTS

ANTENNAS AND PROPAGATION

Interference Flux During Reflection of Heterogeneous Waves (K. N. Bakinovskiy, A. I. Kirilenko, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA, No 7, Jul 84).....	1
Absolute Measurements of Radiation Intensity From Cassiopeia-A, Cygnus-A and Crab Nebula in 60-100 cm Band (M. Ye. Miller; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA, No 7, Jul 84).....	1
Axial Focusing of Signal From Distant Point Radiator Reflected Twice in Deep Paraboloid (M. I. Fayngaol; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA, No 7, Jul 84).....	2
Investigation of Generation of Oscillations Using Anomalous Doppler Effect (D. V. Gorozhanin, B. I. Ivanov, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA, No 7, Jul 84).....	3
Time Spectra of Intensity Fluctuations Along Reflecting Path (Ye. A. Monastyrnyy, G. Ya. Patrushev, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA, No 7, Jul 84).....	3
Temperature Dependence of Propagation of High-Current Electron Beam Through Drift Space (M. A. Vlasov, I. P. Denisova, et al.; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 84).....	4

Models of Discontinuous Random Fields (V. Ya. Kontorovich; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 84).....	4
Experimental Verification of Beam Deflection From Hybrid Reflector Antenna Within Wide-Angle Sector (B. Ye. Kinber, V. I. Klassen, et al.; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 84).....	5
Problem of Diffraction by Wavy Surface: Comparison of Numerical Methods of Solution (L. A. Vaynshteyn, A. I. Sukov; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 84).....	6
Synthesis of Multistep Directional Couplers With Nonminimum- Phase Characteristics (A. P. Gorbachev, S. G. Neverov; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 84).....	6
Scattering of Waves by Axisymmetric Edge (V. A. Kaloshin, A. P. Popov; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 84).....	7
Error in Compensating Phase Fluctuations of Wave Field by Means of Adaptive Reflectors With Continuous or Compound Surface (V. G. Taranenko; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 84).....	8
Adaptive Control of Airborne Radar Antennas (G. S. Zelenkov, A. G. Mikerov, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE, No 9, Sep 84).....	8
Synthesis of Optimum Single-Channel Discrete Signals and Filters (V. M. Koshevoy, A. A. Kononov; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, No 8, Aug 84)....	9
Efficiency of Multitarget Signal Detection by Digital Radar Data Processing Devices (V. Ya. Plekin, M. M. Lednev; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, No 8, Aug 84)....	10
Synthesis of Optimum Algorithms for Secondary Processing (A. M. Shloma, V. P. Volchkov; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, No 8, Aug 84)....	10
Optimization of Number of Pulses in Detection of Fluctuating Optical Signals (F. I. Khaytun, R. B. Shemshedinov; RADIOTEKHNIKA, No 9, Sep 84).....	11

Diffraction on Periodic Grounding System of Finite Length (G. I. Veselov, Yu. N. Alekhin, et al.; RADIOTEKHNIKA, No 9, Sep 84).....	11
Correctness of Reflection Characteristics of Radio Absorbent Materials (M. A. Monin; RADIOTEKHNIKA, No 9, Sep 84).....	12
Short-Range Radiotechnical Point Sensor (O. I. Shelukhin, Yu. P. Kernov, et al.; RADIOTEKHNIKA, No 9, Sep 84).....	12
Factorized Algorithms for Combined Spatial and Temporal Processing of Radar Signals (V. I. Chaykovskiy; RADIOTEKHNIKA, No 9, Sep 84).....	13
Exact Design Formulas for Field Intensity of Dipole Deployed Above Flat Homogeneous Earth With Finite Conductivity (L. S. Tartakovskiy; RADIOTEKHNIKA, No 9, Sep 84).....	13

BROADCASTING/CONSUMER ELECTRONICS

Change of Electrical Characteristics of Radio-Frequency Cables Under Thermal Effect (A. V. Lobanov, P. P. Pavlov, et al.; ELEKTROTEKHNIKA, No 9, Sep 84).....	14
Spectral Evaluation of Irregularity of Superconducting Coaxial Cables (D. Ya. Gal'perovich, A. A. Laptev; ELEKTROTEKHNIKA, No 9, Sep 84).....	14
Surge Strength of Symmetric Cable With Monolithic Polyethylene Insulation of Quads (V. K. Miroshnichenko; ELEKTROTEKHNIKA, No 9, Sep 84)....	15
Theory of Diaphragm Light Modulators With Electrical Input Signal (Yu. P. Gushcho, A. S. Sigov; ZHURNAL NAUCHNOY I PRIKLADNOY FOTOGRAFII I KINEMATOGRAFII, No 5, Sep-Oct 84).....	16
A Posteriori Increase of Resolving Power of Optical System Forming Averaged Monochromatic Images (P. A. Bakut, A. I. Deryugina, et al.; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 84).....	16
Dispersion Characteristics of Small-Mode Gradient Optical Fibers (L. A. Frenkel'; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 84).....	17

U067 Portable Power Amplifier (Yu. N. Kostyuchenkova, Yu. A. Nikiforov, et al.; TEKHNICA KINO I TELEVIDENIYA, No 8, Aug 84).....	17
New Stage in Development of Soviet Cinematography (F. T. Yermash; TEKHNICA KINO I TELEVIDENIYA: No 8, Aug 84).....	18
Computer-Aided Determination of Correction Parameters in Bit- Mapped Printing of Motion Picture Images (V. M. Vas'kin, O. G. Ovilko, et al.; TEKHNICA KINO I TELEVIDENIYA, No 8, Aug 84).....	18
Microprocessor System for Automatic Adjustment of Color Television Cameras (B. N. Bychkov, V. A. Dambit, et al.; TEKHNICA KINO I TELEVIDENIYA, No 8, Aug 84).....	19
Prospects for Development of Cinematography Techniques (Yu. A. Vasilevskiy, V. G. Komar, et al.; TEKHNICA KINO I TELEVIDENIYA, No 9, Sep 84).....	19
Devices for Synchronizing Magnetic Recording and Video Equipment (A. K. Yermolin; TEKHNICA KINO I TELEVIDENIYA, No 9, Sep 84).....	20
Analog Electronic Signal-Level Regulators (O. B. Koroleva, S. V. Sidorov, et al.; TEKHNICA KINO I TELEVIDENIYA, No 9, Sep 84).....	20
Automatic Set-Up System for Electronic New Gathering Camera (V. V. Meyster, Ya. B. Rozval; TEKHNICA KINO I TELEVIDENIYA, No 9, Sep 84).....	21
'KADR-103STs' Video Tape Recorder (L. G. Lishin; TEKHNICA KINO I TELEVIDENIYA, No 9, Sep 84).....	21
Serial TV Cameras Incorporating K1200TDsM2 Solid State Image Sensor (A. V. Balyagin; TEKHNICA KINO I TELEVIDENIYA, No 9, Sep 84).....	22
Operating Features of Color Television Broadcasting Cameras (TEKHNICA KINO I TELEVIDENIYA, No 9, Sep 84).....	22
Operating Experience With Silver-Zinc Batteries (Yu. G. Starostenko, D. G. Vasil'yev; TEKHNICA KINO I TELEVIDENIYA, No 9, Sep 84).....	23

Method of Improving Transmission Fidelity (A. Yu. Lev, G. S. Markaryan; et al.; IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: RADIOELEKTRONIKA, No 8, Aug 84)....	23
---	----

Comparison of On-Line Methods for Measuring Spectrum Width of Remote Sounding Signal (V. M. Mel'nikov; RADIOTEKHNIKA, No 9, Sep 84).....	24
--	----

CIRCUITS AND SYSTEMS

Methods of Digital Correction for Channels of Multichannel Radar Receivers (Yu. I. Abramovich, V. G. Kachur, et al.; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 84).....	25
---	----

Algorithm in Walsh Function Basis for Analysis of Integrated Microcircuits on MOS-Structures (L. N. Pavlov, Yu. M. Kalnibolotskiy; IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: RADIOELEKTRONIKA, No 8, Aug 84).....	25
---	----

Modeling and Statistical Properties of Flicker Noise (V. P. Palenskis, Yu. A. Lauchyus, et al.; LITOVSKIY FIZICHESKIY SBORNIK, No 2, Feb 84).....	26
---	----

Investigation of Bimodal Paramagnetic Filter (V. G. Zaytsev; RADIOTEKHNIKA, No 9, Sep 84).....	27
---	----

Programmable Filter With Fanned Interdigital Surface Acoustic Wave Transducer (S. A. Dobershteyn, A. N. Rozhdestvenskiy; IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: RADIOELEKTRONIKA, No 9, Sep 84).....	27
---	----

Gyrator Frequency Selectors With Bandwidth Independent of Input Signal Level (V. A. Sidiyak, Ya. M. Verkhovskiy; IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: RADIOELEKTRONIKA, No 9, Sep 84)....	28
---	----

Synthesis of Quasi-Optimum Two-Level Signal Discriminator With Level Changing at Unknown Point (A. Ye. Kraskovskiy; IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: RADIOELEKTRONIKA, No 9, Sep 84).....	28
---	----

Use of Walsh Functions for Calculating Characteristics of Digital Filters With Impulse Response of Finite Duration (A. V. Titov; IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: RADIOELEKTRONIKA, No 9, Sep 84).....	29
--	----

COMMUNICATIONS

Asymptotically Optimum Multialternative Sequential Procedures for Discernment of Processes Minimizing Average Length of Observations (M. M. Fishman; RADIOTEKHNIKA I ELEKTRONIKA, No 9, Aug 84).....	30
Extraction of Signals From Background Interference With Unknown Parameters in Quantized Sample (A. N. Dmitriyenko; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 84).....	31
Applicability of Log-Normal Model to Probabilistic Description of Quasi-Pulse Interference (V. D. Rubtsov, A. N. Zaytsev; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 84).....	31
Accuracy of Approximation of Bayes Estimates in Presence of Noninformative Parameters (A. P. Trifonov, Ye. P. Yenina; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 84).....	32
Increasing of Bandwidth of Telephone Channels Employed for Remote Reporting (A. A. Tereping; TEKHNIKA KINO I TELEVIDENIYA, No 8, Aug 84).....	32
Interfacing Akkord-1200 Data Transmission Equipment With YeS9002 Magnetic Tape Preparation Device (A. T. Timchenko; AVTOMATIKA, TELEMEXHANIKA I SVYAZ', No 9, Sep 84).....	33
Repair and Adjustment of PR11 and VXW100 Radios (B. M. Lapshin, V. T. Brezgunov; AVTOMATIKA, TELEMEXHANIKA I SVYAZ', No 9, Sep 84).....	33
Improving Operating Reliability of YeSK 400Ye Telephone Exchanges (S. I. Khramchenkov; AVTOMATIKA, TELEMEXHANIKA I SVYAZ', No 9, Sep 84).....	34
Energy Characteristics of a Voice Signal Amplifier (T. A. Goreva, V. M. Kibakin; IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: RADIOELEKTRONIKA, No 8, Aug 84)....	35
Reception of Signal With Unknown Amplitude and Duration Submerged in White Noise (A. P. Trifonov, V. K. Buteyko; IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: RADIOELEKTRONIKA, No 8, Aug 84)....	35

Use of Bigaussian Approximation To Describe Fading in Scattering Communications Channel (L. T. Sushkova, Ye. Ya. Marchenko, et al.; RADIOTEKHNIKA, No 9, Sep 84).....	36
Machine Analysis of Resonance Characteristics of Plate-Type Radio Electronic Equipment Constructions (A. M. Tartakovskiy; RADIOTEKHNIKA, No 9, Sep 84).....	36
Computing Convolution of Multifrequency Signal Employing Truncated Fast Fourier Transform Algorithms (V. U. Sysoyev; RADIOTEKHNIKA, No 9, Sep 84).....	37
Synthesis of Quasi-Optimum Algorithms for Signal Recognition Against Background of Correlated Noise Employing Discrete Spectral Transformations (A. I. Rog, A. A. Sirota, et al.; RADIOTEKHNIKA, No 9, Sep 84).....	37
Probability of Detection of Pulsed Signals Employing Zero- Gating Interference Suppression (Yu. D. Ivanov; RADIOTEKHNIKA, No 9, Sep 84).....	38
New Convolution and Discrete Fourier Transformation Algorithms Based on Rectangular Transformations Over Field of Roots of Unity (A. T. Baykova; RADIOTEKHNIKA, No 9, Sep 84).....	38
Reception Noise Immunity of Multiposition Signals (V. S. Girshov; RADIOTEKHNIKA, No 9, Sep 84).....	39
Noise Tolerance of Diversity Reception in Frequency-Adaptive Digital Transmission Systems (M. Ya. Lesman, G. Sh. Tukh; RADIOTEKHNIKA, No 9, Sep 84).....	39
Analysis of Interference Caused by Interfering Radio Signals in Communications Systems With Frequency Separation of Telephone Channels and Frequency Modulation (N. I. Kalashnikov, A. P. Stepanov; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, No 9, Sep 84)....	40
Investigation of Influence of Communications Link and Synchronization Error on Noise Tolerance of Group Transmission of Binary Information Based on Orthogonal Walsh Functions (V. A. Vershinin, V. S. Lando; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, No 9, Sep 84)....	40

Approximate Rules for Signal Detection Against Background of Gaussian Correlated Interference (V. M. Frolushkin; IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: RADIOELEKTRONIKA, No 9, Sep 84).....	41
Use of Importance Sampling To Investigate Signal Detection Systems by Simulation Method (S. Z. Kuz'min, S. S. Kostina; IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: RADIOELEKTRONIKA, No 9, Sep 84)....	41
Noise Immunity of Information Transmission System With Pseudorandom Frequency Switching Under Worst-Case Interference Conditions (A. M. Chudnov; IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: RADIOELEKTRONIKA, No 9, Sep 84).....	42

COMPONENTS, HYBRIDS AND MANUFACTURING TECHNOLOGY

Stability of Highly Nonlinear Oxide-Zinc Resistors Under Continuous Voltage of Industrial Frequency (K. B. Dem'yanenko, A. S. Sergeyev; ELEKTROTEKHNIKA, No 9, Sep 84).....	43
Electrodynamic Stability of Composite Liquid-Metal Contacts (Osip Borisovich Bron, Vladimir L'vovich Belvayev; IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: ELEKTROMEKHANIKA, No 8, Aug 84).....	44
Planar Ferroelectric Microcapacitors for Microwave Devices (M. I. Gubler, V. N. Keys, et al.; IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: RADIOELEKTRONIKA, No 9, Sep 84)....	44

COMPUTERS

Organization of Coupling of Microprocessor With Storage Devices (B. L. Sorokin, S. A. Yablonskiy; AVTOMATIKA, TELEMEXANIKA I SVYAZ', No 9, Sep 84).....	46
Fourier Transformation Executor Based on K580 Microprocessor (A. V. Yegoshin, Yu. Yu. Mal'gin, et al.; IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: RADIOELEKTRONIKA, No 8, Aug 84).....	46
Test Equipment for K580IK80-Based Microprocessor Systems (V. A. Kaninskiy, A. F. Teslyuk; RADIOTEKHNIKA, No 9, Sep 84).....	47

Microprocessor Controller for Implementing Algorithms for Adaptive Radio Signal Processing in Antenna Arrays (V. V. Gorodilin, Ye. I. Glushankov; RADIOTEKHNIKA, No 9, Sep 84).....	47
--	----

Digital Computer Sample Synthesizers With Minimum Memory (A. N. Fadeyev; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, No 9, Sep 84).....	48
---	----

CONTROL SYSTEMS

Principles of Synthesis of Functionally Reserved Automatic Control Systems (V. V. Solodovnikov, V. I. Tumarkin; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE, No 9, Sep 84).....	49
---	----

ELECTRICAL INSULATION

Optimization of Overall Dimensions of Enclosures for Low- Voltage Devices and Equipment (Davyd Markovich Zektser, Boris Vladimirovich Klimenko; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA, No 8, Aug 84).....	50
--	----

Dielectric Measurements in Infralow-Frequency Band (A. A. Belov, V. V. Potemkin, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, No 9, Sep 84).....	51
--	----

Winding Insulation in Electromagnetic Systems for Tokamak Reactor Plants (V. V. Maslov, S. G. Trubachev; ELEKTROTEKHNIKA, No 8, Aug 84).....	51
---	----

ELECTRON DEVICES

Thermally Stimulated Conductivity in Semi-Insulating Gallium Arsenide (V. S. Rinkyavichyus, G. S. Kavalyauskene; LITOVSKIY FIZICHESKIY SBORNIK, No 2, Feb 84).....	53
---	----

Non-Self-Maintained High-Voltage Low-Pressure Discharge (V. S. Boldasov, A. I. Kuz'michev, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA, No 7, Jul 84).....	54
---	----

Analysis and Design of Linear Microwave Transistor Amplifiers (G. V. Petrov; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 84).....	54
Numerical Simulation of Inverters With I^2L Elements Including Effects of High Doping Level (I. I. Abramov; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, No 8, Aug 84).....	55
Electrothermal Transducer With Short Time Constant (S. G. Bogdanov, L. K. Bogdanova; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, No 9, Sep 84)....	56
INDUSTRIAL ELECTRONICS AND CONTROL INSTRUMENTATION	
Reliability of Drive Control System With Redundancy (Vladimir Pavlovich Bulekov; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA, No 8, Aug 84).....	57
Adaptive Tuning of Control System for Keying Devices (Vladimir Fedorovich Shtakan, Svetlana Nikolayevna Kurnosova; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA, No 8, Aug 84).....	58
Current Limiting in Wideband Position Control System With Triple Integration Without Velocity Control Loop (Al'bert Ignat'yevich Gul'; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA, No 8, Aug 84)....	58
Computer Aided Design of Automatic Control Systems for Multidimensional Chemical-Technological Objects (V. L. Perov, S. A. Turkatov, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE, No 9, Sep 84)...	59
INSTRUMENTATION AND MEASUREMENTS	
Microcomputer Simulation of Calculator-Observer of State Vector of Electromechanical Systems (Sergey Aleksandrovich Konovalov, Yuriy Aleksandrovich Nikitenko, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA, No 8, Aug 84).....	60
Functional Characteristics of Pyramidal Frequency Synthesizers and Methods of Designing Such Devices (N. P. Yampurin; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, No 8, Aug 84).....	61
MAGNETICS	
Calculation of Gap Permeance and Electromagnetic Torque for Valve Electromagnet (G. A. Bugayev; ELEKTROTEKHNIKA, No 9, Sep 84).....	62

Study of Ferromagnetic Materials by Method of Magnetic Correlation Analysis (Karel Gruska, Kamil Vrba; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, No 8, Aug 84)....	62
Fields and Radiation of 'True' and Current Magnetic Dipoles Located in Medium (V. L. Ginzburg; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA, No 7, Jul 84).....	63
Average Magnetic Characteristics of Industrial Magnetically Hard Alloys (A. I. Gridnev, V. M. Tyurin, et al.; ELEKTROTEKHNIKA, No 8, Aug 84).....	64
MICROWAVE THEORY AND TECHNIQUES	
Synthesis of Optimum Smooth Transition in Microstrip Trough Line on Microwave Integrated Circuit (A. A. Yashin, Ya. M. Choban; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 84).....	65
4TH All-Union Seminar on High-Frequency Relativistic Electronics (Conclusion) (G. S. Nusinovich; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA, No 7, Jul 84).....	65
Partial-Region Method for Diffraction Problems With Non-Coordinate Boundaries (G. I. Veselov, V. M. Temnov; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA, No 7, Jul 84).....	66
Millimeter-Wave Range Masers (a Review) (N. T. Cherpak; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA, No 7, Jul 84).....	67
Effect of Space-Charge Field on Output Characteristics of O-Type Oscillators With Distributed Interaction (D. M. Vavriv, O. A. Tret'yakov, et al.; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 84).....	67
Integrated Optical Components Utilizing Acoustooptic and Electrooptic Diffraction in Micro-Waveguides (V. A. Voznesenskiy, V. A., GASSANOV, L. G., et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, No 8, Aug 84).....	68

POWER ENGINEERING

State of Art and Trends in Design of Fractional-kW Induction Motors With Solid-Iron Rotor (K. A. Alikhanyan; ELEKTROTEKHNIKA, No 8, Aug 84).....	69
Improving Vibroacoustic Characteristics of Axial Face-Type Induction Motors (V. A. Ignatov, A. A. Stavinskiy, et al.; ELEKTROTEKHNIKA, No 8, Aug 84).....	70
Radial Mechanical Vibrations of Brushes in Electrical Machines (M. L. Dridzo, I. Yu. Glebova; ELEKTROTEKHNIKA, No 8, Aug 84).....	70
Calculation of Braking Torque in Magnetic Bearing With Conducting Rotor (Vyacheslav Ivanovich Kuvykin; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA, No 8, Aug 84)....	71
Integrated Utilization of Renewable Energy Sources (G. I. Denisenko; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA, No 10, Oct 84).....	72
Effect of Combining Power Systems With Different Consumer Operating Conditions (M. N. Khodzhayev; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA, No 10, Oct 84).....	72
Analysis of Electrodynanic Forces Acting on Multilayer Cryoresistive Inductor (A. B. Kubaldin, R. K. Dzhaparova; ELEKTROTEKHNIKA, No 9, Sep 84).....	73
Measuring Static Load on Direct-Current Motor With Aid of Dynamic Model (G. P. Kornilov, A. S. Karandayev, et al.; ELEKTROTEKHNIKA, No 9, Sep 84).....	73

QUANTUM ELECTRONICS/ELECTRO-OPTICS

Mathematical Modeling of Two-Frequency Laser Sounding of Scattering Media (A. V. Belinskiy; ZHURNAL NAUCHNOY I PRIKLADNOY FOTOGRAFII I KINEMATOGRAFII, No 5, Sep-Oct 84).....	75
Geophysical Laser Interferometer With 12.5 Meter Base (A. S. Gorshkov, M. N. Dubrov; RADIOTEKHNIKA I ELEKTRONIKA, No 9, Aug 84).....	75

Investigation of Dynamics of Radiation Spectrum of Injection Lasers by Infrared Impulse Fourier Spectroscopy (A. A. Akimov, A. S. Logginov, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, No 9, Sep 84).....	76
Invariance of Probability Characteristics of Detector to Shape of Optical Pulse Signals (K. Ye. Romyantsev, V. S. Firsov; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, No 9, Sep 84)....	77
SONICS AND ULTRASONICS	
Generation of Longitudinal Acoustic Waves by Modulated Helicon Waves (N. Ye. Vigdorchik; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA, No 7, Jul 84).....	78
Acoustooptic Demodulation of Frequency-Modulated Signals (M. P. Vasil'yev; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 84).....	78
Acoustooptic Cell as Space-Frequency Filter (V. I. Balakshiy; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 84).....	79
Accuracy of Random Signal Spectral Parameter Estimation Against Interference Background in Acoustooptical Spectrum Analyzers (G. S. Nakhmanson; RADIOTEKHNIKA, No 9, Sep 84).....	80
Experimental Study of High-Stability Oscillator With Surface-Acoustic-Wave Resonator in Feedback Loop (Yu. V. Gulyayev, V. I. Grigor'yevskiy, et al.; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 84).....	80
TRANSPORTATION	
Computer-Aided Design of Spring Suspension for High-Speed Ground-Transportation Vehicle (Vladimir Ivanovich Malakhov; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA, No 8, Aug 84)....	81
Heat Transfer Through Air Gap Between Inductor and Reaction Rail of Linear Induction Motor Driving High-Speed Ground-Transportation Vehicle (Poris Nikolayevich Minayev, Yuriy Petrovich Konakov; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA, No 8, Aug 84).....	82

NEW ACTIVITIES, MISCELLANEOUS

Problems in Producing Fourth Generation of Electro- Cardiostimulators (V. I. Adas'ko; ELEKTROTEKHNIKA, No 9, Sep 84).....	83
Lithuanian Academy of Sciences Physics Institute: Sixth Annual Scientific Conference (LITOVSKIY FIZICHESKIY SBORNIK, No 2, Feb 84).....	83
Cost Accounting During Period of Experimental Evaluation (Experience in Minsk Electrical Equipment Manufacturing Plant Imeni V. I. Kozlov) (T. B. Troitskaya; ELEKTROTEKHNIKA, No 9, Sep 84).....	84

UDC: 535.132

INTERFERENCE FLUX DURING REFLECTION OF HETEROGENEOUS WAVES

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian
Vol 27, No 7, Jul 84 p 948

BAKINOVSKIY, K. N., KIRILENKO, A. I. and TITOV, A. D.

[Abstract] The incidence of an electrically polarized wave on the interface boundary between two absorbing media is examined for the case in which reflection and transmission are accompanied by conversion of the polarization (wave types), and the coupling of the wave amplitudes at the boundary is described by 2×2 reflection and transmission matrices. The incident wave is assigned on a polarization basis which makes it fairly simple to determine the properties of non-coplanar reflection of heterogeneous waves when the phase normal vector, the amplitude normal vector and normal to the interface boundary is examined. The occurrence of two kinds of interference fluxes is noted. The first is generally associated with the interference between incident and reflected waves of the same types (polarization), while the second is caused by the superimposition of different types of waves.

[47-6900]

UDC: 523.164.3

ABSOLUTE MEASUREMENTS OF RADIATION INTENSITY FROM CASSIOPEIA-A, CYGNUS-A
AND CRAB NEBULA IN 60-100 cm BAND

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 27,
No 7, Jul 84 (manuscript received 11 Feb 83, after revision 1 Nov 83)
pp 934-938

MILLER, M. Ye., Scientific-Research Radio Physics Institute

[Abstract] This study describes the title measurements made during August-October 1982 at the "Staraya Pustyn'" polygon of NIRFI [Scientific-Research Radio Physics Institute]. The measurements were made with a 5-meter "black" disk in the Fresnel zone of a 12-meter radiotelescope. The disk, which filled a solid angle of $60^\circ 7'$ and stood at an angle of 20° to the horizon,

was placed on a 25-meter tower 42 meters from the aperture plane of the radiotelescope. The radiation from the source was received with the radio focused at infinity. The following experimental parameters are tabulated: source flux S_v , wavelength, diffraction correction, diffraction correction error, error in increment of calibration standard temperature, error determined by random sensitivity threshold, and a combined mean square measurement error. Spectra are plotted for Cassiopeia-A Cygnus-A and the Crab Nebula. The author thanks L. V. Dmitrenko and S. A. Pelyushenko for assistance during preparation of the experiment and N. M. Tseytlin for helpful comments. Figures 1; tables 1; references 7: 4 Russian, 3 Western, [47-6900]

UDC: 538.574.621.372

AXIAL FOCUSING OF SIGNAL FROM DISTANT POINT RADIATOR REFLECTED TWICE IN DEEP PARABOLOID

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 27, No 7, Jul 84 (manuscript received 10 Jun 83; after revision, 6 Jun 83) pp 944-947

FAYNGAOL'D, M. I., Institute of Physics, Ukrainian SSR Academy of Sciences

[Abstract] Double reflection of a signal in a deep paraboloid is investigated for the general case in which the incident signal source is on the optical axis of the reflector at a finite distance so that the incident wave is spherical. It is found that even slight divergence of the incident radiation disturbs the structure of the exiting beam significantly; however, the axial focusing is retained and may even increase causing, inter alia, the occurrence of a second "volumetric" focus outside the paraboloid. The possibility of exploiting the corresponding effects is discussed. The problem is investigated in beam approximation; the diffraction effect is taken into account along the axis, where the beam approximation does not apply. Figures 1; references: 6 Russian. [47-6900]

INVESTIGATION OF GENERATION OF OSCILLATIONS USING ANOMALOUS DOPPLER EFFECT

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian
Vol 27, No 7, Jul 84 (manuscript received 5 Jul 83) pp 880-891

GOROZHANIN, D. V., IVANOV, B. I. and KAPCHINSKIY, M. I.

[Abstract] The generation of axially asymmetrical slow cyclotron waves in the absolute instability mode is experimentally investigated. Resonant oscillation conditions and the saturation mode are studied. It is demonstrated experimentally that the generation of oscillations using the anomalous Doppler effect is accompanied by an increase in the transverse kinetic electron energy in the beam. A method is proposed for measuring the transverse electron velocity in the beam and estimating the kinetic energy of the transverse electron wave movement. A simple ratio is established and verified between the total beam wave energy and the kinetic transverse electron movement energy which is common for different configurations of beams and types of oscillations. An upper-bound estimate is obtained for the efficiency of excitation systems for slow cyclotron waves. The authors thank Ya. R. Faynberg, Yu. P. Bliokh, V. A. Butsa, I. N. Onishchenko, and L. A. Yudin for interest in the work and discussion of the results. Figures 8; references 23: 19 Russian, 4 Western.
[47-6900]

TIME SPECTRA OF INTENSITY FLUCTUATIONS ALONG REFLECTING PATH

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 27, No 7, Jul 84 (manuscript received 13 Dec 82; in finished version, 27 Jun 83) pp 907-912

MONASTYRNYI, Ye. A., PATRUSHEV, G. Ya., PETROV, A. I. and POKASOV, V. V.,
Institute of Atmospheric Optics, Siberian Department, USSR Academy of Sciences

[Abstract] Synchronous measurements of the time spectra of intensity fluctuations along line-of-sight paths with reflection from simple man-made objects - a disk mirror and a corner reflector - are described. The results are compared with findings obtained by the time field method and the Huygens-Kirchoff method. It is found that the time spectra of intensity fluctuations on reflecting paths differ from the spectra on the direct paths. The differences are especially large for a spherical wave reflected from a flat mirror (the spectrum shifts to the high frequency region because of amplification of intensity fluctuations) and for a narrow beam reflected from a corner reflector (with the spectrum shifting in the opposite direction). The experimental spectra on the line-of-sight path change within the bounds

determined analytically by a "local freezing" approximation. The authors thank T. P. Pecherkin and A. P. Rostov for assistance in conducting the experiment and preparation of the results. Figures 4; references: 9 Russian. [47-6900]

UDC 537.533.3

TEMPERATURE DEPENDENCE OF PROPAGATION OF HIGH-CURRENT ELECTRON BEAM THROUGH DRIFT SPACE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84
(manuscript received 26 Nov 82) pp 1595-1599

VLASOV, M. A., DENISOVA, I. P. and NIKONOV, S. V.

[Abstract] Propagation of a "cold" high-current electron beam with cylindrically symmetric neutralization through the drift space is analyzed, taking into account nonisochronous betatron oscillations and resulting collisionless relaxation during intermixing of particle trajectories. The dependence of that relaxation and of the equilibrium state on the initial temperature is determined, assuming an isotropic initial temperature distribution. The distribution of transverse velocity components is assumed to become anisotropic, as a result of radial motion of electrons and attendant fluctuations of the beam radius about some average. The corresponding second-order differential equation in a cylindrical system of coordinates has been solved numerically by the method of coaxial current tubes with appropriate boundary conditions. The results agree closely with theoretical analysis of the transient process. Figures 3; references 10: 6 Russian, 4 Western (1 in Russian translation). [57-2415]

UDC 517.2

MODELS OF DISCONTINUOUS RANDOM FIELDS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84
(manuscript received 5 Jul 82) pp 1551-1554

KONTOROVICH, V. Ya.

[Abstract] When the theory of state variables is applied to optimal synthesis of signal processing devices in space-time channels, it becomes necessary to simulate signals and interference with stochastic partial differential equations. Models of interference are discontinuous random fields, typically with a Poisson distribution. Stochastic partial differential equations generating such fields as their solution include a linear equation, wave equations such as those describing propagation through randomly non-homogeneous media, and Kolmogorov-Feller equations corresponding to point or multipoint probability distributions. The statistical characteristics of

stationary uniform fields satisfying these equations are analyzed, assuming that such discontinuous random fields exist. References: 7 Russian.
[57-2415]

UDC 621.396.677

EXPERIMENTAL VERIFICATION OF BEAM DEFLECTION FROM HYBRID REFLECTOR ANTENNA
WITHIN WIDE-ANGLE SECTOR

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84
(manuscript received 26 May 83) pp 1462-1471

KINBER, B. Ye., KLASSEN, V. I., TOBOLEV, A. K. and SHISHLOV, A. V.

[Abstract] An experiment with a hybrid reflector antenna was performed for the purpose of correlating actual beam deflections through a wide range of angles with theoretical calculations on the basis of the geometrical-optics approximation. A special antenna was built for this experiment, allowing up to 30° deflections of a 1° wide beam. It consisted of a radiator in the form of an inaccurate E-plane waveguide array and an asymmetric reflector in the shape of a parabolic cylinder. Excitation amplitudes and phases were regulated by means of dielectric and dissipative matching inserts in the waveguides. The near-field region was probed by the compensation method in an anechoic chamber, diffraction components and edge waves as well as interference of the latter with the geometrical-optics field causing oscillations of the readings and attendant deviations from theory. The error of the geometrical-optics approximation is found not to exceed the error of measurements and not to depend on the deflection angle. This indicates a close correspondence between theoretical and experimental data. At small deflection angles the geometrical-optics approximation characterizes a spherical wave, indicating the size and the position of the radiator as the deflection angle approaches zero. At large deflection angles the geometrical-optics approximation yields more asymmetric side lobes. The authors thank M. M. Izmaylov for assistance in calculations, L. B. Karabut, K. E. Yefimenko and A. E. Kazaryan for assistance in measurements, R. I. Ratushkin, A. V. Kuzovkin, V. D. Zhuchkov, A. N. Tret'yakov, A. S. Proshin, S. I. Klintonov and V. A. Spiridonov for constructing the antenna, and B. A. Remizov, V. K. Shilo, I. N. Ross and V. A. Kolobov for consistent support of the study and discussion of its results. Figures 7; tables 1; references: 6 Russian.
[57-2415]

PROBLEM OF DIFFRACTION BY WAVY SURFACE: COMPARISON OF NUMERICAL METHODS OF SOLUTION

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84
(manuscript received 1 Mar 83) pp 1472-1478

VAYNSHTEYN, L. A. and SUKOV, A. I.

[Abstract] The problem of diffraction of a wave whose field satisfies the equation $\frac{\partial^2 \phi}{\partial x^2} + \frac{\partial^2 \phi}{\partial y^2} + k^2 \phi = 0$ by a periodically wavy surface described by the

equation $y = h(x) = h(x \pm 2\pi)$ ($-\alpha \leq h(x) \leq \alpha$, $k = L/\lambda$ - principal diffraction parameter, L - period of surface waviness, $\omega = 2\pi c/\lambda$ - frequency of incident wave, $e^{-j\omega t}$ - variation in time, λ - wavelength of incident radiation, c - speed of sound or light) is solved by reduction to an integral equation of the first kind for the simplest (Dirichlet) boundary condition $\phi = 0$. The numerical integration is performed independently by three methods. The integral-equation method is based on series expansion of the two functions in the integral equation. In the Rayleigh method the reflected field is resolved into diffraction waves all the way to the surface, where the boundary condition is an equally-reflected field and incident field. In the Masel-Merril-Miller method, refined by R. G. Barantsev, the Rayleigh hypothesis and the Dirichlet condition are extended by analytic continuation.. Numerical solutions obtained for a sinusoidally wavy surface on an M-10 calculator, with the aid of fast Fourier transformation, indicate that high-capacity high-speed computers should make it feasible to advance from approximate methods such as perturbations and physical optics to more rigorous exact mathematical ones. Figures 4; references 7: 2 Russian, 5 Western (1 in Russian translation). [57-2415]

UDC 621.372.832

SYNTHESIS OF MULTISTEP DIRECTIONAL COUPLERS WITH NONMINIMUM-PHASE CHARACTERISTICS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84
(manuscript received 26 Oct 82) pp 1479-1486

GORBACHEV, A. P. and NEVEROV, S. G.

[Abstract] Design and performance of multistep directional couplers on strip lines are examined, considering that the coupling coefficients and the phase characteristics depend largely on the location of zeros of the transfer function. Nonminimum-phase directional couplers are of particular interest, inasmuch as their use in radiation pattern shaping systems reduces the necessary number of differential phase shifter and also lowers dissipative

losses in the strip line. The electrical parameters of such a coupler are calculated on the basis of either Chebyshev or maximally-flat polynomial approximation of the power division factor. Synthesis takes into consideration that the coupling coefficients at steps, functions of the wave impedance, are either larger or smaller than unity depending on which zeros and specifically complex-conjugate pairs of zeros lie in the right-hand half-plane. Subsequent analysis indicates that various multistep structures with the same phase-frequency characteristic but differently shifting the relative phases of signal are possible. Experimental data on a six-step directional coupler built on a printed-circuit board confirm theoretical results, when power losses in the conductors and in the dielectric structure as well as variance of geometrical dimensions are accounted for. Figures 5; references 19: 8 Russian, 11 Western (1 in Russian translation).
[57-2415]

UDC 537.874.6

SCATTERING OF WAVES BY AXISYMMETRIC EDGE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84
(manuscript received 6 Sep 82) pp 1502-1509

KALOSHIN, V. A. and POPOV, A. P.

[Abstract] Scattering of the boundary wave in a beam by an axisymmetric edge of an ideally conducting body is analyzed according to the physical theory of diffraction, for determination of the resulting radiation pattern in the integral representation. The field of the incident wave is assumed to be the superposition of two fields differently polarized, one magnetically with the electric field vector parallel to the edge and one electrically with the magnetic field vector parallel to the edge, so that the corresponding vector problem can be reduced to two scalar ones. The physical theory yields only the first term of a uniform asymptotic expansion in inverse powers of the wave number, evaluation of successive terms requiring a nonuniform asymptotic expansion such as the two-beam expansion for refinement of the Kirchhoff approximation. One example of calculations is for an axisymmetric reflector antenna with an electric dipole radiator on the axis perpendicular to it. Another example is the open end of a circular waveguide with an infinitely wide axisymmetric flange. Figures 1; references 10: 8 Russian, 2 Western.
[57-2415]

ERROR IN COMPENSATING PHASE FLUCTUATIONS OF WAVE FIELD BY MEANS OF ADAPTIVE REFLECTORS WITH CONTINUOUS OR COMPOUND SURFACE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84
(manuscript received 30 May 83) pp 1510-1515

TARANENKO, V. G.

[Abstract] Adaptive reflectors are considered for compensation of phase fluctuations of a wave field in optical or radio telescopes. The mechanism being based on the relation between the space characteristics of phase fluctuations and the dimensions of the controllable reflector surface segment. Three methods of such a compensation have already been developed: 1) progressive shifting of movable reflector segments; 2) progressive shifting as well as tilting of movable reflector segments; 3) bending of continuous fixed reflector surface. The dispersion of phase fluctuations in the reflected wave field is calculated for each case as function of the statistical characteristics of phase fluctuations in the incident field and as function of the characteristic dimension of the controllable reflector surface. This dispersion characterizes the compensation error and depends on the ratio of that characteristic reflector dimension to the coherence radius of turbulence in the atmosphere. In turn, the ratio of this error to the dispersion of phase fluctuations in a turbulent atmosphere depends on the ratio of characteristic reflector dimension d to telescope aperture diameter D according to the relation $\sigma_e^2/\sigma_t^2 = A(d/D)^{5/3}$ ($\alpha = 0.146$ for a reflector with shifting of segments, $\alpha = 0.097$ for a reflector with shifting and tilting of segments, $\alpha = 0.125$ for a reflector with bending of continuous surface). Figures 2; references 9: 6 Russian (1 Russian concerned with foreign radio electronics), 3 Western.
[57-2415]

UDC: [681.513.682:621.396.67]:629.7

ADAPTIVE CONTROL OF AIRBORNE RADAR ANTENNAS

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE
in Russian Vol 27, No 9, Sep 84 pp 83-90

ZELENKOV, G. S., MIKEROV, A. G., POLYAKHOV, N. D., PUTOV, V. V.
and YAKOVLEV, A. V., Leningrad

[Abstract] Two signal-adaptation structures are described for automatic airborne radar antenna control systems, each consisting of a nonlinear unsteady object of control with known structure whose parameters (functional matrices A and B) vary within defined limits; one of the systems also has a standard model with mixed matrices A_m and B_m having the same structure as matrices A and B with elements based on the required control performance

of the control system. In addition to compensating for instability of various parameters, adaptive control also provides improved accuracy or reduced system weight, which are interrelated for airborne equipment. Adaptive control makes it possible to expand the cutoff frequency of the system to the resonance frequency through circuit engineering. Adaptive control also reduces the cost of automatic control systems by eliminating expensive, unreliable electromechanical sensors and replacing them with adaptive identifiers. The simplification in technology also makes it easier to manufacture electrical mechanisms. Further, significant savings result from reducing equipment adjustment and operating costs, meaning that the use of adaptive control is economically justified as well. Figures 5; references: 11 Russian.
[60-6900]

UDC 621.391.2

SYNTHESIS OF OPTIMUM SINGLE-CHANNEL DISCRETE SIGNALS AND FILTERS

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 8, Aug 84 (manuscript received, after revision, 1 Dec 83)
pp 62-65

KOSHEVOY, V. M. and KONONOV, A. A.

[Abstract] Synthesis of optimum discrete signals and filters for single-channel processing, specifically signals with linear frequency-modulation of the phase, is considered on the basis of the quadratic optimality criterion. In the case of signals with a reciprocal indeterminacy function the problem reduces to finding the complex signal and filter envelopes which will maximize the crest-to-valley ratio in the time-frequency plane. The most typical five variants of the problem are: 1) with the signal vector given, find the filter vector which maximizes that ratio; 2) find both signal and filter vectors which will maximize that ratio; 3) with absolute values of the signal given, find both signal and filter vectors which will maximize that ratio; 4) with the filter matched to the signal, find the signal vector which maximizes that ratio; 5) with the filter matched to the signal and absolute values of the signal given, find the signal vector which will maximize that ratio. A suboptimum procedure is proposed for solving these problems, a procedure less unwieldy than optimal solution and based on minimization of the "proximity" criterion. As such a criterion is regarded the distance between the law of signal phase modulation and the sought signal in the L^2 -space. Figures 1; references 8: 7 Russian, 1 Western.
[58-2415]

EFFICIENCY OF MULTITARGET SIGNAL DETECTION BY DIGITAL RADAR DATA PROCESSING DEVICES

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 8, Aug 84 (manuscript received, after revision, 6 Dec 83)
pp 75-78

PLEKIN, V. Ya. and LEDNEV, M. M.

[Abstract] The efficiency of multitarget signal detection by a multichannel digital radar data processing device which uses the algorithm of discrete Fourier transformation for spectral analysis is estimated, considering that each frequency channel contains a phase detector, and analog-to-digital converter, a memory, a Fourier transformation stage, a sampler of maximum amplitudes, a threshold device, and an output commutator switch. The problem is formulated for M channels processing m statistically independent signals which cannot "jump" from one channel to another during detection. Into consideration is taken the possibility of a high false-alarm probability at a low signal-to-noise ratio, because of the detection threshold then being exceeded in $n > m$ channels. The correct-detection probability D_M^m is calculated on this basis. The theoretical results have been verified on a computer by statistical simulation of algorithms of the Monte Carlo method, with a generator of random numbers and with a noise generator shaping a normal white noise accompanied by a consonantly fluctuating pulse packet with unknown initial phase. Figures 2; references 4: 3 Russian, 1 Western (in Russian translation).

[58-2415]

SYNTHESIS OF OPTIMUM ALGORITHMS FOR SECONDARY PROCESSING

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 8, Aug 84 (manuscript received 25 Jul 83) pp 22-28

SHLOMA, A. M. and VOLCHKOV, V. P.

[Abstract] A method of constructing the optimum algorithm for secondary processing of data in a radar system that tracks motion of objects with a priori indeterminacy is proposed, namely using the Markov autoregression model for approximation of the object trajectory in accordance with the theory of invariant statistical inferences. This model can account for aerodynamic characteristics of an object moving through the atmosphere, which a stochastic system of differential or difference equations cannot do accurately, even with inclusion of additional perturbing noise, and it is much simpler than the Bayes method of expanding the state vector so as to include

aerodynamic parameters. The autoregression model is constructed in one measurement space of range and azimuth or elevation angle, for separate processing in each coordinate. The a priori indeterminacy is resolved in two steps, by construction of a Kalman filter for the trajectory model after the latter has been identified within appropriate fiducial limits. The algorithm includes estimating the density of fiducial distribution with respect to the Lebesgue measure, application of the Klimov theorem, and randomization of the estimate rather than using a point estimate. References 10: 7 Russian (3 concerned with foreign radio electronics), 3 Western (2 in Russian translation). [58-2415]

UDC: 621.384.32

OPTIMIZATION OF NUMBER OF PULSES IN DETECTION OF FLUCTUATING OPTICAL SIGNALS

Moscow RADIOTEKHNIKA in Russian No 9, Sep 84 (manuscript received 26 Sep 83, after revision) pp 88-91

KHAYTUN, F. I. and SHEMSHEDINOV, R. B.

[Abstract] Optimization of the number of pulses in the observation interval in detecting amplitude-fluctuating optical signals is examined for the cases of detectors not employing inter-pulse processing and detectors employing discrete signal accumulation (binary integration). Optimization of the number of pulses consists of finding the minimum value of the discrete function defining the amount of energy consumed in emitting N pulses. Said discrete function is computed for normal, uniform and exponential signal amplitude distributions. References 5: 3 Russian, 2 Western. [44-6900]

UDC: 621.372.825

DIFFRACTION ON PERIODIC GROUNDING SYSTEM OF FINITE LENGTH

Moscow RADIOTEKHNIKA in Russian No 9, Sep 84
(manuscript received 28 Dec 83, after revision) pp 80-83

VESELOV, G. I., ALEKHIN, Yu. N. and LITVINOVICH, V. V.

[Abstract] An algorithm is presented for solving the problem of diffraction on a delay system of finite length, which reduces the solution to that of infinite systems of linear algebraic equations with good convergence and stable solutions during reduction. The problem of diffraction on a structure consisting of two diaphragms in a flat waveguide is solved as a test of the algorithm. The results of numerical calculations are analyzed

and compared. The proposed rigorous solution of the diffraction problem, as well as the algorithm developed for calculating the reflection coefficients, incorporate no restrictions on the parameters of the structure and can be used effectively for designing devices incorporating delay-structure segments of finite length. Figures 4; references 5: 3 Russian, 1 Bulgarian, 1 Western.
[44-6900]

UDC: 621.371.332

CORRECTNESS OF REFLECTION CHARACTERISTICS OF RADIO ABSORBENT MATERIALS

Moscow RADIOTEKHNIKA in Russian No 9, Sep 84
(manuscript received 5 Jul 83, after revision) pp 83-84

MONIN, M. A.

[Abstract] The coefficient of reflection, defined as $R^2 = P/P_0$, where R^2 - power coefficient reflection; P , P_0 - power of plane wave reflected from an incident upon specimen, is shown to be incorrect for the case of diffuse scattering radio absorbent materials. It is found that the effective scattering area of diffuse scattering radio absorbent material must be measured as a function of the angle of irradiation. Examples of the effective scattering area indicatrx are shown for mirror- and diffuse-scattering radio absorbent material. Radio absorbent materials can exhibit mirror reflection, as well as simultaneous diffusing and diffraction reflection; the corresponding coefficients are found from the effective scattering area of the specimens. Figures 3.
[44-6900]

UDC: 621.396.967.182.4

SHORT-RANGE RADIOTECHNICAL POINT SENSOR

Moscow RADIOTEKHNIKA in Russian No 9, Sep 84 (manuscript received 6 Mar 84)
pp 45-47

SHELUKHIN, O. I., KERNOV, Yu. P. and SHELUKHIN, V. I.

[Abstract] Microwave radiotechnical point sensors employed for position-finding of objects in a monitored region are described. The short-range radiotechnical point sensor includes a direct-signal channel consisting of a transmitting device and a direct-channel receiver, and a reflected-signal channel formed by the same transmitter and a reflected-signal receiver. The operation of the device is described, and formulas are derived for estimating the potential correct detection and false-alarm probabilities of devices operating at short ranges. Figures 2; references: 2 Russian.
[44-6900]

FACTORIZED ALGORITHMS FOR COMBINED SPATIAL AND TEMPORAL PROCESSING OF RADAR SIGNALS

Moscow RADIOTEKHNIKA in Russian No 9, Sep 84
(manuscript received 6 Oct 83, after revision) pp 40-42

CHAYKOVSKIY, V. I.

[Abstract] Digital spatial and temporal maximum-likelihood processing algorithms for dealing with complex envelopes of band signals from two-dimensional antenna arrays are synthesized. Factoring the canonical combined processing algorithm, or its representation as a sequence of several procedures, reduces the amount of computation significantly and makes the computation easier to organize. The possibility of factoring is determined by the features of the structure of the signal matrix and the properties of its elements. The factored algorithm implements three functionally identical multiplications of a three-dimensional data matrix and some two-dimensional matrix-operator. Each such procedure is broken down into simpler multiplications of different vector-sections of the data matrix by the matrix-operator. The group nature of the procedures makes it possible to parallel the computation, and the three-stage structure of the algorithm facilitates pipelining. Factored maximum-likelihood space and temporal processing algorithms are found to be a successful alternative for existing canonical and traditional algorithms for processing band signals in digital systems employing discrete arrays. References 6: 5 Russian, 1 Western.

[44-6900]

UDC: 621.396.67

EXACT DESIGN FORMULAS FOR FIELD INTENSITY OF DIPOLE DEPLOYED ABOVE FLAT HOMOGENEOUS EARTH WITH FINITE CONDUCTIVITY

Moscow RADIOTEKHNIKA in Russian No 9, Sep 84
(manuscript received 20 Oct 83, after revision) pp 29-34

TARTAKOVSKIY, L. S.

[Abstract] Formulas are derived and plotted which can be used for practical calculation of the field intensity of a balanced or unbalanced vertical or horizontal dipole deployed over a flat homogeneous ground with finite conductivity regardless of the angle of inclination of the beam connecting the transmitting and receiving points. Beam and wave expressions for the field are considered and conditions are derived for the applicability of geometric optics. The approximate region of wavelengths within which the dipole field formulas are applicable is analyzed. The author thanks G. Z. Ayzenberg for valuable advice, taken into account during writing the paper. Figures 5; references 9: 7 Russian, 2 Western.

[44-6900]

UDC 621.315.2.029.6.017.71

CHANGE OF ELECTRICAL CHARACTERISTICS OF RADIO-FREQUENCY CABLES UNDER THERMAL EFFECT

Moscow ELEKTROTEKHNIKA in Russian No 9, Sep 84
(manuscript received 9 Mar 83) pp 45-46

LOBANOV, A. V., engineer, PAVLOV, P. P., candidate of technical sciences, and KHRENKOV, N. N., candidate of technical sciences, Special Design Office of the Cable Industry

[Abstract] Four basic temperature-dependent electrical parameters of r-f cables are described by expressions which facilitate an analysis of their sensitivity to temperature effects, these parameters being capacitance, wave impedance, attenuation factor and phase-shift factor. Calculations for coaxial cables are based on an equivalent dielectric permittivity of the insulation system, including air gap between dielectric and outer conductor produced in the manufacturing process as well as the air gap between dielectric and inner conductor produced by variation of the radius of the latter. Mechanical strains affecting the system geometry are found from the solution to Lamé's problem for thin-walled cylinders and Hooke's law extended to a three-dimensional state of stress. For illustration, numerical results are given for RK 50-3-28-Pr high-precision cables with monolithic Teflon-4D insulation (dielectric constant $\epsilon = 2.03$ at 20°C). Figures 1; references: 4 Russian. [64-2415]

UDC [621.315.212:537.312.62].001.4

SPECTRAL EVALUATION OF IRREGULARITY OF SUPERCONDUCTING COAXIAL CABLES

Moscow ELEKTROTEKHNIKA in Russian No 9, Sep 84
(manuscript received 4 Mar 83) pp 46-48

GAL'PEROVICH, D. Ya., candidate of technical sciences, LAPTEV, A. A., engineer, and PODSHIVALOV, A. Yu., engineer

[Abstract] Conventional superconducting coaxial cables are considered, with Teflon-4D insulation between the inner conductor made of niobium wire and the

outer conductor made of monolithic lead tubing. Irregularity of such cables is not structural but produced in the manufacturing process. It has been found to consist of a random component and quasi-periodic strongly correlated deviations of geometric dimensions, particularly the diameter, over the cable length. This compound irregularity has been evaluated on two specimens of such a cable, by spectral analysis of the wave impedance as function of the cable length. Profilograms of the diameter variation over the cable length were supplemented with space-frequency spectra, following a Fourier transformation of the wave impedance, namely the frequency spectrum of the transform modulus squared (phase relations not being relevant here) and of the reflection coefficient. Reflectometer readings and echograms were processed by the method of the instantaneous mean. An inverse transformation has yielded the profile of wave impedance over the cable length. Figures 5; references 5: 2 Russian, 3 Western (1 in Russian translation).
[64-2415]

UDC [621.315.2:621.39].019.34

SURGE STRENGTH OF SYMMETRIC CABLE WITH MONOLITHIC POLYETHYLENE INSULATION OF QUADS

Moscow ELEKTROTEKHNIKA in Russian No 9, Sep 84 (manuscript received 4 Mar 83)
pp 48-50

MIROSHNICHENKO, V. K., engineer, Moscow Institute of Electrical Communication Engineering

[Abstract] The lightning resistance of MKP_MASH_p-4x4x1.05+2x0.7 symmetric railroad communication cables operating along the Baykal-Amur line was evaluated in terms of the dielectric strength of their insulation system, in failure-free operation. The insulation system in these cables consists of monolithic polyethylene around each quad core and polyethylene sleeving around each aluminum sheath. Experimental data for this evaluation had been obtained by measurement of the voltage between conductor bundle and sheath, this voltage being the highest during a lightning stroke, not only along cable segments between repeater points but also in splices and in potheads. A comparison with similar data in MKSA_pSh_p-4x4x1.2 cables indicates that the tested MKP_MASH_p cables have a much higher surge strength. Figures 1; tables 3; references: 4 Russian.
[64-2415]

THEORY OF DIAPHRAGM LIGHT MODULATORS WITH ELECTRICAL INPUT SIGNAL

Moscow ZHURNAL NAUCHNOY I PRIKADNOY FOTOGRAFII I KINEMATOGRAFII in Russian Vol 29, No 5, Sep-Oct 84 (manuscript received 26 Jul 82; after revision, 20 Jan 84) pp 324-328

GUSHCHO, Yu. P. and SIGOV, A. S., Moscow Institute of Electrical Engineering, Electronics and Automation

[Abstract] A theory of diaphragm light modulators employing potential and charge relief control is presented which allows for irregularity of the electrical field, finite diaphragm thickness and finite mechanical constants. The deforming electrical forces and mechanics of deformation of a diaphragm of finite thickness are analyzed. It is recommended that the thickness of the membrane should be made as little as possible in order to improve modular sensitivity; only after this has been done should the modulo of elasticity of the material be reduced. The findings can be extended to diaphragm light modulators with optical input signals. Figures 3; references 9: 5 Russian, 4 Western (1 in Russian translation).

[63-6900]

UDC 621.391.837.029.74

A POSTERIORI INCREASE OF RESOLVING POWER OF OPTICAL SYSTEM FORMING AVERAGED MONOCHROMATIC IMAGES

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84 (manuscript received 17 Mar 83) pp 1589-1594

BAKUT, P. A., DERYUGINA, A. I. and MANDROSOV, V. I.

[Abstract] An optical imager is considered which, with a diffraction-limited lens system, forms monochromatic images of objects with random surface roughness by transforming the light intensity distribution in the plane of the object into an averaged light intensity distribution in the plane of the image. The coherent pulse response of such a device with a Gaussian aperture function is calculated from the approximate solution to the corresponding Fredholm integral equation of the second kind with the field-point scattering function. On this basis the feasibility is of superresolution through increase of the resolving power by a posteriori signal processing. For illustration, this method is applied to a two-point object not resolvable according to the Rayleigh criterion. Figures 2; references 9: 6 Russian, 3 Western (2 in Russian translation).

[57-2415]

DISPERSION CHARACTERISTICS OF SMALL-MODE GRADIENT OPTICAL FIBERS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84
(manuscript received 15 Jun 83) pp 1451-1456

FRENKEL', L. A.

[Abstract] The performance of fiber-optic waveguides axially regular but with a radially variable or only piecewise-uniform refractive index is analyzed, of particular interest being the variation of group velocity and the dispersion characteristics that determine it. The fiber core of a lossless waveguide is assumed to have the same magnetic permeability as the ambient medium, and the latter to have a uniform dielectric constant. The dispersion equation is derived and the wave number as a function of the frequency is calculated for the HE_{11} -mode, considering that the two tangential field components must be continuous at the waveguide-sheath interface. The corresponding boundary-value problem for the Maxwell field equations is formulated in a cylindrical coordinate system. It is solved by eliminating the radial field components from these equations, defining the initial conditions, and subsequently applying the Runge-Kutta method of the appropriate order of precision. The process involves minimizing two functions, namely the jumps of the two tangential field components at the interface as functions of the wave number and of a coefficient which characterizes the ratio of the two longitudinal waveguide-mode field components. The iterative algorithm, with selection of the initial approximation, has been programmed in FORTRAN for a YeS 1035 computer. Calculations have been performed for an optical fiber with a core made of $SiO_2 + GeO_2$ and a sheath made of SiO_2 , having a radial profile of the refractive index $n^2(r, \lambda) = 1 + a_1 \lambda^2 / (\lambda^2 + b_1) + a_2 \lambda^2 / (\lambda^2 + b_2) + a_3 \lambda^2 / (\lambda^2 + b_3)$ (r - radial coordinate, λ - wavelength) with numerical values of the coefficients a, b based on experimental data. Figures 4; tables 3; references 7: 6 Russian, 1 Western.

[57-2415]

UDC: 621.375.026

U067 PORTABLE POWER AMPLIFIER

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 8, Aug 84 pp 46-52

KOSTYUCHENKOVA, Yu. N., NIKIFOROV, Yu. A. and TARASOV, E. P., Central Design Bureau for Cinematography Equipment, Scientific Production Association "Ekran"

[Abstract] This article describes the new U067 power amplifier, which is designed to replace the U059 employed for relaying recorded music and commands for on-location filming. The U067 is a class-AB push-pull amplifier which uses pre-processing of the input signal and incorporates additional reliability-enhancing devices. The technical specifications of the device are presented,

and schematic diagrams of the final amplifier, preamplifier and filter, input device, power supply protection device and power supply are traced and explained. The U067 eliminates deficiencies discovered in the U059 during its production and operation in film studios around the country. Figures 7; references: 6 Russian.
[53-6900]

NEW STAGE IN DEVELOPMENT OF SOVIET CINEMATOGRAPHY

Moscow TEKNIKA KINO I TELEVIDENIYA in Russian No 8, Aug 84 pp 3-6

YERMASH, F. T., chairman, USSR State Committee on Cinematography

[Abstract] The provisions of a decree entitled 'Measures for Continued Improvement of Ideological and Artistic Level of Films and Consolidating the Material-Technical Base of Cinematography' adopted in April, 1984 by the Central Committee of the CPSU and USSR Council of Ministers are outlined. The decree considers ideological-artistic, organizational and material-economic aspects of cinematography as a whole, representing a long-range program for a new phase in the development of Soviet films. The decree places major stress on ensuring improvement in the ideological and artistic quality of every film produced. The improvement of studio facilities is stressed, and the use of material incentive to increase viewership is outlined. The improvement of films, cameras and other equipment is discussed. Areas in which individual film organizations are lagging are outlined. Progress in constructing new theaters is described.
[53-6900]

UDC: 778.588:778.68]-52

COMPUTER-AIDED DETERMINATION OF CORRECTION PARAMETERS IN BIT-MAPPED PRINTING OF MOTION PICTURE IMAGES

Moscow TEKNIKA KINO I TELEVIDENIYA in Russian No 8, Aug 84 pp 12-22

VAS'KIN, V. M., OVILKO, O. G. and SHRAYBER, S. I.

[Abstract] A method is described for computer-aided control of a bit-mapped printing process which makes it possible to use objective data on the parameters of an electronic bit-mapped printing device, the type of film employed and the type of chemical-photographic processing, plus analysis of the gradation and frequency characteristics of the original negative to a model and determine the optimum control parameters for the bit-mapped process and to obtain copies with the required gradation and frequency characteristics. Experimental equipment incorporating the algorithms developed is described. The method and equipment make it possible to exploit the technical capabilities of bit-mapped electronic copying devices, and eliminate the traditional trial

method based on subjective assessment of trial positives. Figures 11;
references: 8 Russian.
[53-6900]

UDC: 621.397.61:681.772.7]:621.397.132]:681.325.5-181.4

MICROPROCESSOR SYSTEM FOR AUTOMATIC ADJUSTMENT OF COLOR TELEVISION CAMERAS

Moscow TEKNIKA KINO I TELEVIDENIYA in Russian No 8, Aug 84 pp 35-41

BYCHKOV, B. N., DAMBIT, V. A., KALININ, N. A., KUZNETSOV, N. N., ROMASHOV, B. A.
and TIMOFEEV, B. S., Leningrad Institute of Aviation Instrument Engineering

[Abstract] A new microprocessor system for automatic adjustment of color television transmitting cameras is described which operates by making an objective assessment of light-signal conversion performance in transmitting two or three achromatic gray-scale test signals which are compared with a standard signal produced by a special generator. The structural diagram of the microprocessor system which implements the proposed method is explained. The system facilitates automatic adjustment and correction of distortions of transmitting tv cameras and camera channels. A transmitting camera can be fully adjusted within about 90 seconds; adjustments can be refined between transmissions in 18 seconds: black and white levels can be balanced, and rasters centered within 7 seconds. Figures 6; references 9: 6 Russian, 3 Western (2 in Russian translation).
[53-6900]

UDC: 778.5(47+57)

PROSPECTS FOR DEVELOPMENT OF CINEMATOGRAPHY TECHNIQUES

Moscow TEKNIKA KINO I TELEVIDENIYA in Russian No 9, Sep 84 pp 3-12

VASILEVSKIY, Yu. A., KOMAR, V. G., CHERNOV, V. G. and CHESNOKOV, A. M.

[Abstract] Basic trends in the development of cinematography for the period 1960-1982 are analyzed on the basis of a system approach. The current status and future requirements of the following areas are outlined in brief: electronic cinematography and video techniques; three-dimensional cinematography; cinematography systems employing different frame formats; stereophonic sound; film equipment, optics and operator equipment, movie lighting technology and equipment, technology and equipment for studio recording and dubbing of sound tracks; technical facilities for recording, reproducing and playing back sound tracks; films and magnetic tapes; technology and equipment for producing original film materials and copies; projection equipment; distribution and storage of films by showing organizations and means for automation; an improvement of the management mechanism in cinematography and public showing. Measures are outlined to consolidate the material-technical base of Soviet cinematography. Figures 8.
[43-6900]

DEVICE FOR SYNCHRONIZING MAGNETIC RECORDING AND VIDEO EQUIPMENT

Moscow TEKHNIIKA KINO I TELEVIDENIYA in Russian No 9, Sep 84 pp 13-16

YERMOLIN, A. K., Central Design Bureau for Cinematography Equipment, Scientific Production Association (TsKBK NPO) "Ekran"

[Abstract] A sound-picture synchronization system is proposed that employs a microcomputer for all hardware control operations. A processor communicates with the video and audio recorders via a keyboard and display. A video recorder interface device interfaced with a 30K18 program control panel is described in detail. The interface device translates control instructions from the console to the video recorder, which is the master device, in order to control the tape transport mechanism; the interface device also receives and processes tape-position signals from the video and audio recorders. The tape-position signals are presented in SMPTE address-time code. The use of the video recorder interface device in an integrated audio equipment system has made it possible to pre-test equipment for audio makeup of films with the use of video facilities. The use of the interface device in television and film studios is described. Figures 4; references 6: 4 Russian, 2 Western. [43-6900]

UDC: 681.84:621.3.037.372

ANALOG ELECTRONIC SIGNAL-LEVEL REGULATORS

Moscow TEKHNIIKA KINO I TELEVIDENIYA in Russian No 9, Sep 84 pp 19-23

KOROLEVA, O. B., SIDOROV, S. V. and TARASOV, E. P., Central Design Bureau for Cinematography Equipment, Scientific Production Association (TsKBK NPO) "Ekran"

[Abstract] The development of analog electronic signal level regulators and their use in high fidelity sound equipment are analyzed. The use of pulse-width modulation and the 'log-antilog' method for electronic level regulation is explained. Schematic diagrams of the pulse-width modulator, pulse-amplitude modulator and demodulator employed in the pulse-width modulation scheme are traced and explained. The use of log and antilog converters to implement a voltage-controlled amplifier is explained. It is found that it is easier to obtain the required noise level by using the pulse-width modulation method; however, it is harder to provide a wide regulation range and small nonlinear distortions than with the log-antilog method. The log-antilog method is found to be most promising; the Central Design Bureau for Cinematography Equipment is developing an improved log-antilog electronic signal level regulator. Figures 6; references 11: 5 Russian, 6 Western (1 in Russian translation). [43-6900]

AUTOMATIC SET-UP SYSTEM FOR ELECTRONIC NEWS GATHERING CAMERA

Moscow TEKHNKA KINO I TELEVIDENIYA in Russian No 9, Sep 84 pp 24-29

MEYSTER, V. V. and ROZVAL, Ya. B., All-Union Scientific-Research Institute for Television and Radio Broadcasting

[Abstract] An automatic set-up system for automatic news gathering cameras is described which minimizes the amount of time required to prepare the camera for operation, eliminates the need for technical personnel in the set-up process, and makes it possible to perform set-up under any operating conditions. The system provides automatic black and white balance, automatic centering and automatic diaphragm setting. The black-and-white balancing procedure is simple enough that it can be performed with the camera hand-held under field conditions. The automatic raster centering system employs a simple device which analyzes the integral matching error and a device which seeks system control signal output values which minimize that error. Block diagrams of the automatic centering system, read-only memory, automatic balancing system and automatic diaphragm setting system are presented and analyzed. The technical specifications of the system are given. Figures 8, references: 2 Russian.

[43-6900]

"KADR-103STs" VIDEO TAPE RECORDER

Moscow TEKHNKA KINO I TELEVIDENIYA in Russian No 9, Sep 84 pp 38-45

LISHIN, L. G.

[Abstract] A new KADR-103STs studio video tape recorder, which is suitable for use in program recording, editing and transmission, is described. The recorder employs Soviet produced T-4314-25 or CVE-26R (BASF) or V-16 (Sony) tapes. Black and white or color tv signals with standard parameters are recorded over the video channel. Two audio channels are used to record stereophonic audio, or two different audio programs. The third audio channel is used for an address-time code, and the fourth is used to record editing comments. The technical specifications of the magnetic tape, the video channel and audio channels are presented. The structural diagram of the system is provided. The construction of the tape transport mechanism and moving-head assembly is analyzed. The use of high speed editing and special playback modes facilitates the work of artistic personnel. Figures 9; tables 9; references: 11 Russian.

[43-6900]

UDC: 621.397.61:681.772.7].077.49

SERIAL TV CAMERAS INCORPORATING K1200TDSM2 SOLID STATE IMAGE SENSOR

Moscow TEKNIKA KINO I TELEVIDENIYA in Russian No 9, Sep 84 pp 46-47

BALYAGIN, A. V.

[Abstract] The KT-2-1 and KT-2-2 CCD television cameras are described. The video signal produced by the KT-2 can be played back on a standard video monitor or television receiver. These cameras can reproduce at least six grey levels, and provide a video signal-to-random noise ratio of at least 42 dB. A KT-2 camera fitted with a VEGA lens measures 234 x 122 x 60 mm and weighs less than 1.2 kg. The camera provides stable operation at temperatures of 223-313°K. Figures 4; references 12: 6 Russian, 6 Western (2 in Russian translation).

[43-6900]

UDC: 621.397.61:681.772.7]:621.397.132

OPERATING FEATURES OF COLOR TELEVISION BROADCASTING CAMERAS

Moscow TEKNIKA KINO I TELEVIDENIYA in Russian No 9, Sep 84 pp 48-53

[Abstract] Some of the adjustment characteristics of color television cameras, as well as the test patterns and signals employed for adjustment, are examined. Equalization of actual channel sensitivities with respect to a white field is discussed. Adjustments and tests for linear channel amplitude responses are described. The use of a 'grey wedge' signal to adjust gamma-correctors is explained. The adjustment of limiting levels in color cameras is discussed. Testing for transient responses in color television cameras with more than one channel is described. The amplitude-frequency characteristic of the luminance or quasi-luminance channels is analyzed. KT-132 camera parameters which must be checked daily are tabulated, Figures 11; tables 1.

[43-6900]

OPERATING EXPERIENCE WITH SILVER-ZINC BATTERIES

Moscow TEKNIKA KINO I TELEVIDENIYA in Russian No 9, Sep 84 p 60

STAROSTENKO, Yu. G. and VASIL'YEV, D. G.

[Abstract] The development of a method and corresponding equipment for extending the operating life of silver-zinc batteries are described. The use of line power when possible to preserve battery life is discussed; while the solution is helpful in the studio, it does not solve the problem for field operations. Improvements to the 15EPSS power supply are described which have made it possible to test batteries bank-by-bank, so that malfunctioning banks, rather than entire batteries, can be replaced when necessary. A small automatic charger developed for silver-zinc batteries is described. Figures 1; references: 1 Russian.

[43-6900]

UDC 621.394.62

METHOD OF IMPROVING TRANSMISSION FIDELITY

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 27, No 8, Aug 84 (manuscript received, after revision, 21 Feb 84) pp 84-85

LEV, A. Yu., MARKARYAN, G. S. and PARFENOV, Ye. I.

[Abstract] One possible method of improving the fidelity of transmission and reception of bipolar pulses is based on treating the formation of such pulse as 1B-2T encoding, with only two words $\{B_1\} = \{1; -1\}$ and $\{B_2\} = \{-1; 1\}$ of all nine possible ones $\{B_i\} = \{x_i; y_i\}$ ($x_i = 0; \pm 1$, $y_i = 0; \pm 1$, $i = 1, 9$) allowed and the distance between them defined in the Minkowski metric. The receiver consists of two resolvers, a clock-frequency discriminator, two pulse shapers (for positive and negative polarity respectively), a series-parallel encoder (2-digit ternary code) and a decoder. Calculation of the error probability in this method and in element-by-element reception reveals that in this method, at a given dispersion of interference, there exists a minimum error probability which depends on the threshold voltage and this optimum threshold voltage can be determined for any value of the pulse amplitude. Figures 2; references: 3 Russian.

[58-2415]

COMPARISON OF ON-LINE METHODS FOR MEASURING SPECTRUM WIDTH OF REMOTE SOUNDING SIGNAL

Moscow RADIOTEKHNIKA in Russian No 9, Sep 84 (manuscript received 15 Oct 83, after revision) pp 42-44

MEL'NIKOV, V. M.

[Abstract] The pulse-pair algorithm is compared with measurement of the spike frequency of the signal for incoherent sounding systems. In the spike frequency measurement method, the frequency of spikes of the output signal from the sounding system exceeding a specified level is measured, and the variance of the spectrum of the scattered radiation is found. In the pulse-pair method the variance of the spectrum is also found by computing the signal power correlation coefficient directly and then deriving the variance. The spike frequency measurement method is found to be superior for spectrum width measurement: the estimate of the spectrum width has less bias because the sounding system operates in the pulse mode; the procedure is influenced less by noise; the measurement time is shorter when the average signal value is known; and the equipment used to implement the method is much simpler. Figures 3; references 7: 4 Russian, 3 Weste
[44-6900]

UDC 621.372.54.037.372

METHODS OF DIGITAL CORRECTION FOR CHANNELS OF MULTICHANNEL RADAR RECEIVERS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84
(manuscript received 12 Dec 82) pp 1544-1550

ABRAMOVICH, Yu. I., KACHUR, V. G. and STRUCHEV, V. F.

[Abstract] The efficiency of adaptively tunable digital corrective filters in channels of radar receivers with space processing of signals is evaluated from the standpoint of optimization by cyclic convolution. Calculations for two signals at the output, one from each of any two channels, and a signal with a white noise at the input indicate that a matrix-circulant minimizing the dispersion of error and representable in the form $D = U^* \Lambda U$ (U^* - Hermitian conjugate, Λ - diagonal matrix of circulant eigenvalues, U - matrix of discrete Fourier transformation) will yield filters at least as efficient as transversal filters with an equivalent memory. Figures 1; tables 2; references 6: 4 Russian, 2 Western (1 in Russian translation).
[57-2415]

UDC 621.372.061

ALGORITHM IN WALSH FUNCTION BASIS FOR ANALYSIS OF INTEGRATED MICROCIRCUITS ON MOS-STRUCTURES

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 27, No 8, Aug 84 (manuscript received 5 Nov 83) pp 39-44

PAVLOV, L. N. and KALNIBOLOTSKIY, Yu. M.

[Abstract] Use of a Walsh function basis facilitates computer-aided design and performance analysis of integrated microcircuits, especially of those built on MOS structures for discrete processing of analog signals. As the integration scale increases here, so does the variance of correspondingly smaller geometrical dimensions and so does the deviation of electrophysical parameters. An analysis with direct application of the Walsh function basis

then becomes difficult and unwieldy so that a faster convergence is needed for coverage of a wide range of simultaneously varying circuit parameters and external conditions, while taking into account all possible nonlinearities in the output characteristics. An algorithm is proposed to meet this need for any number of variable parameters, an algorithm which optimizes the convergence by minimizing the norm of differences between output (solution) vectors obtained in successive iterations. This is achieved by conversion of the deviations matrix into the Gray code, that can be regarded as a diadic vector. The procedure is demonstrated for the case where deviations of circuit components, signal sources, and power supplies are describable by Rademacher functions. In the Gray code only one parameter will change at each step, while all others remain deviating from their nominal values by a constant amount. After the corresponding system of nonlinear equations has been formulated, its Jacobian is evaluated iteratively in the Broyden-Chenault-Fletcher approximation. The algorithm was applied to an emitter follower operating as buffer amplifier in an MOS transistor array. All calculations on a BESM-6 high-speed computer required only 30 min, while requiring more than 1 h without conversion to the Gray code. Figures 2; references 8: 6 Russian (1 concerned with foreign radio electronics, 2 Western (both in Russian translation). [58-2415]

UDC: 536.75:519.216

MODELING AND STATISTICAL PROPERTIES OF FLICKER NOISE

Vilnius LITOVSKIY FIZICHESKIY SBORNIK in Russian Vol 24, No 2, Feb 84
(manuscript received 21 Jan 83) pp 32-41

PALENSKIS, V. P., LAUCHYUS, Yu. A. and MIKOLAYTIS, G. S., Vilnius State University imeni V. Kapsukas

[Abstract] Mathematical modeling of random processes with long-term correlation - their spectral characteristics are probability distribution density and steadiness - are investigated, with primary stress on processes with a $1/f$ spectrum. A $1/f$ power spectrum exhibits a single pulse of the type $A \cdot t^{-1/2}$ (for $t > \tau_1$, where τ_1 is some time constant). The analysis employs Fourier analysis of the pulses, and indicates that as Q approaches unity the spectrum index approaches 0, i.e. the spectrum becomes uniform. The autocorrelation functions, spectra and probability distribution functions of the random processes in question are determined as functions of the exponent of the random pulses. It is found that a random process consisting of the sum of random $A_1 \cdot t^{-1/2}$ pulses has all of the statistical parameters of $1/f$ noise measured in real systems. Behavior of the statistical parameters of $1/f$ noise which differs from analogous parameters of thermal noise is determined only by the shape of $1/f$ spectrum, rather than by some other unsteady phenomena. Figures 5; tables 1; references 11: 6 Russian, 5 Western (2 in Russian translation). [54-6900]

INVESTIGATION OF BIMODAL PARAMAGNETIC FILTER

Moscow RADIOTEKHNIKA in Russian No 9, Sep 84
(manuscript received 18 Nov 83, after revision) pp 85-87

ZAYTSEV, V. G.

[Abstract] Analytical expressions are proposed for the working attenuation and phase response of a bimodal microwave paramagnetic filter. The bandwidth of the filter is found to increase as the amount of paramagnetic material until the bandwidth of the cavity is reached, which is determined by its Q-factor. This relationship makes it possible to select the optimum amount of material as a function of the requirements for the filter, whether the narrowest possible bandwidth, or minimum losses. A number of paramagnetic bimodal filters are investigated with center frequencies between 5 and 10 GHz. Comparison between the calculated and experimental curves within the passband of the filter indicates that the expressions for the working attenuation and phase response agree closely. Figures 4; references 8: 4 Russian, 4 Western (1 in Russian translation).
[44-6900]

UDC: 621.3.032

PROGRAMMABLE FILTER WITH FANNED INTERDIGITAL SURFACE ACOUSTIC WAVE TRANSDUCER

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 9, Sep 84 (manuscript received 11 Mar 84, after revision) pp 69-71

DOBERSHTEYN, S. A. and ROZHDESTVENSKIY, A. N.

[Abstract] A programmable filter with a fanned interdigital transducer and an array of small-aperture receiving transducers is investigated. The amplitude-frequency characteristics of the filter are formed by combining elements of the array in a common receiving system by means of electronic switches and a summing amplifier. The form of the amplitude-frequency characteristic is improved by using weighted processing of the electrodes of the fanned interdigital transducer by capacitive weighting. The array elements consist of small-aperture fanned transducers. A formula is derived for the frequency response of the filter. The frequency responses of a programmable filter with Hamming-function weighting of the electrodes are calculated. A programmable surface acoustic wave filter is fabricated on a Y-cut 128° lithium niobate piezoelectric substrate. It is found that such programmable filters make it possible to synthesize a wide set of frequency responses, and can be used for frequency selection in radio communication systems. Figures 1; references 4: 3 Russian, 1 Western (in Russian translation).
[61-6900]

GYRATOR FREQUENCY SELECTORS WITH BANDWIDTH INDEPENDENT OF INPUT SIGNAL LEVEL

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 9, Sep 84 (manuscript received 12 Mar 84, after revision) pp 76-77

SIDYAK, V. A. and VERKHOVSKIY, Ya. M.

[Abstract] A frequency selector is described in which the bandwidth is independent of the level of the input signal. The selector employs two channels in which the amplitude-frequency characteristics are formed by combining the signals from the outputs of the gyrators, which are part of the resonators, with the help of summing amplifiers. A working model based on series 409 SS4 gyrators and K140UD1A microcircuits is described. The use of resonators connected in parallel and antiphase followed by detection of the output voltage of the summing amplifiers and comparison by a dc comparator is recommended for gyrator frequency selectors. The dynamic range of the filter can be increased, and the operating band stability improved, by using detectors with low threshold voltage. Figures 1; references: 2 Russian.

[61-6900]

SYNTHESIS OF QUASI-OPTIMUM TWO-LEVEL SIGNAL DISCRIMINATOR WITH LEVEL CHANGING AT UNKNOWN POINT

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 9, Sep 84 (manuscript received 8 Feb 84, after revision) pp 46-50

KRASKOVSKIY, A. Ye.

[Abstract] Optimum estimates are derived for the moments at which the level of a two-level signal changes. The analysis assumes that digitization of an additive mixture of a binary signal and normal random noise results in a sequence of random quantities with irregularity manifested by a change in the mathematical expectation at an unknown point. A circuit is derived for a quasi-optimum two-level signal discriminator. The noise tolerance of the proposed discrimination method is estimated; graphs are plotted to illustrate the behavior of the logarithm, and of the error probabilities occurring in testing the hypothesis that the level has changed using the likelihood ratio. The receiving synthesizer is most effective under conditions of a priori indeterminacy with regard to the moment of delay of the signal. Figures 2; references 6: 5 Russian, 1 Western.

[61-6900]

USE OF WALSH FUNCTIONS FOR CALCULATING CHARACTERISTICS OF DIGITAL FILTERS
WITH IMPULSE RESPONSE OF FINITE DURATION

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 9, Sep 84 (manuscript received 25 Nov 83, after revision) pp 50-53

TITOV, A. V.

[Abstract] A method is examined for designing digital filters with impulse responses of finite duration based on the spectral characteristics of Walsh functions in the frequency domain. The method allows any such filter to be represented as Walsh filters connected in parallel. When the impulse response is assigned, the frequency responses can be found by using the spectral characteristics of the Walsh functions; when the complex gain is assigned the impulse response is determined by superimposing Walsh functions. The method is advantageous in that it reduces the amount of computation by eliminating digital resonators whose implementation requires multiplication operations. The number of additions in implementing the Walsh filter can be reduced by using a fast Hadamard transform algorithm. Figures 1; references: 8 Russian.
[61-6900]

ASYMPTOTICALLY OPTIMUM MULTIALTERNATIVE SEQUENTIAL PROCEDURES FOR DISCERNMENT OF PROCESSES MINIMIZING AVERAGE LENGTH OF OBSERVATIONS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84
(manuscript received 11 Nov 82) pp 1516-1524

FISHMAN, M. M.

[Abstract] The problem of multialternative sequential discernment of processes is formulated in terms of conditionally optimum procedures minimizing the average length of observations, without any probabilistic assumptions about any one occurring process, rather than in terms of Bayes procedures minimizing the average risk. An m -dimensional ($m \geq 1$) random process $y(t) = y_1(t), \dots, y_m(t)$ observable in a continuous time period $t \geq 0$ is considered, with $y(t) = y_{(j)}(t)$ at $\theta = j$, $j = \overline{1, K}$ (θ - parameter with respect to which $K \geq 2$ hypotheses " $H_j: \theta = j$ " are tested for the discernible random processes $y_1(t), \dots, y_K(t)$, respectively). A class Δ of rules with equiprobable partial erroneous solutions is defined and the probability of partial erroneous solution for each rule α is related to the corresponding conditional average length of observations through classical inequalities, with an upper bound stipulated for that probability. The problem is to find the procedure that will transform those inequalities into equalities. The problem is formulated for various models of signal observation and data processing: 1) discernment of signals from background interference by means of a multichannel system; 2) discernment of pulse sequences with unknown time delay; 3) discernment of harmonic signals with unknown frequency. An asymptotically optimum sequential procedure is constructed which compares the statistics of the likelihood ratio with the mean-weighted likelihood ratio and estimates the upper bound for conditional average lengths of observations. This procedure is shown to remain valid as the upper bound for the probability of erroneous partial solutions decreases approaching zero and the number of hypotheses increases approaching infinity. It also remains valid under certain special constraints on that probability such as a threshold. A comparison with a fixed-length procedure reveals that this sequential procedure decreases the length of observations to one quarter, on the average, when the probability of erroneous partial solutions is low. References 14: 8 Russian, 6 Western (4 in Russian translation). [57-2415]

EXTRACTION OF SIGNALS FROM BACKGROUND INTERFERENCE WITH UNKNOWN PARAMETERS IN QUANTIZED SAMPLE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84
(manuscript received 6 Apr 82, after correction 29 Aug 83) pp 1525-1530

DMITRIYENKO, A. N.

[Abstract] Similar decision rules are constructed for detection of signals appearing with background interference in amplitude-quantized samples. These rules are to ensure that the false-alarm probability will not depend on the interference parameters and, therefore, the latter need not be a priori known. Samples with a finite number of realizations $L = (M + 1)^V$ are considered (M - number of quantization levels, V - volume of input sample), including non-randomized as well as randomized decision rules for acceptance of the "signal present" hypothesis through group and its subgroups identification on the basis of their sufficient statistics. Such rules are applied to an independent sample $z = (x, y)$ with binary quantization ($M = 1$) and with multilevel quantization ($M > 1$) respectively, also to multichannel detection of signals in several independent samples $z_r = (x_r, y_r)$ ($r = \overline{1, R}$). The correct-detection probability is calculated for each case. Simple examples demonstrate that ignorance of the interference parameters is much less costly in the case of quantized samples than in the case of nonquantized ones. The author thanks D. D. Sadov for discussion of the results. References: 4 Russian (1 concerned with foreign radio electronics). [57-2415]

APPLICABILITY OF LOG-NORMAL MODEL TO PROBABILISTIC DESCRIPTION OF QUASI-PULSE INTERFERENCE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84
(manuscript received 10 Jan 83) pp 1531-1535

RUBTSOV, V. D. and ZAYTSEV, A. N.

[Abstract] The log-normal probabilistic description of a quasi-pulse interference such as atmospheric noise, based on the physically verifiable exponential dependence of pulse amplitude on attenuation along the propagation path, is validated in accordance with the central-limit theorem in Lyapunov's theory of probability. Conditions are then established for extending the description of the interference envelope with the two-dimensional log-normal model. The additional necessary and sufficient condition in the case of atmospheric noise is constancy of its two-dimensional distribution along the propagation path and thus that the fluctuations of radio wave attenuation have two-dimensional correlation function and energy spectrum. Accordingly, the log-normal model does not apply as well to polar regions during auroral perturbations in the

ionosphere as it does to atmospheric noise in the temperate zones. Theoretical and experimental curves indicate that the log-normal model may also approximate industrial interference. Figures 6; references 5: 2 Russian, 3 Western.
[57-2415]

UDC 621.391

ACCURACY OF APPROXIMATION OF BAYES ESTIMATES IN PRESENCE OF NONINFORMATIVE PARAMETERS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84
(manuscript received 7 Jun 82) pp 1536-1543

TRIFONOV, A. P. and YENINA, Ye. P.

[Abstract] The asymptotic behavior of multidimensional a posteriori distributions as the signal-to-noise ratio increases is used for construction of quasi-optimum estimates. On this basis, a maximum-likelihood estimate is found to approximate a Bayes estimate with asymptotically decreasing mean-square error. The procedure is applicable to a signal with a multidimensional Gaussian distribution of unknown parameters, calculation of the approximation error becoming quite simple when all unknown parameters are not energy-related. A pulse signal with linear frequency modulation mixed with a white noise at the receiver input illustrates how the presence of a noninformative parameter, in this case the Gaussian random frequency, decreases the accuracy of this approximation for estimating the Gaussian random position of the signal in time. References: 10 Russian.
[57-2415]

UDC: 621.395

INCREASING OF BANDWIDTH OF TELEPHONE CHANNELS EMPLOYED FOR REMOTE REPORTING

Moscow TEKNIKA KINO I TELEVIDENIYA in Russian No 8, Aug 84 pp 42-43

TEREPING, A. A., Estonian Republic Radio and Television Center

[Abstract] Equipment is described which makes it possible effectively to expand the bandwidth of voice-grade telephone channels. Two modifications are described: a mobile system, operating in real time, which takes an input 50-2950 Hz signal and shifts all of the spectral components upward by 350 Hz, producing a 400-3300 Hz spectrum which is compatible with the telephone channel band. The signal is fed through the DBX compressor employed in the system and passed over the telephone channel. At the receiving end the signal is passed through the DBX expander of the system into a demodulator which shifts all of the components 350 Hz downward. The relative frequency band (the ratio of the highest and lowest frequencies in the passband) is thus expanded by more

than a factor of 5. The second system, which doubles the bandwidth, can be used to transmit frequencies ranging from 50 to 5900 Hz. This is done by recording the initial signal at one speed, shifting the spectrum and compressing as described above, transmitting the signal over the telephone line, shifting it down at the receiving end, recording it and playing it back at twice the speed. The doubling scheme is now being used to transmit television interviews and reports from the Moscow correspondent's point serving Radio Estonia to Tallinn. Figures 4.
[53-6900]

UDC: 651.3:656.2

INTERFACING AKKORD-1200 DATA TRANSMISSION EQUIPMENT WITH YeS9002 MAGNETIC TAPE PREPARATION DEVICE

Moscow AVTOMATIKA, TELEMEXHANIKA I SVYAZ' in Russian No 9, Sep 84 pp 31-33

TIMCHENKO, A. T., bureau chief, Kiev Information-Computing Center, Ukrainian Republic Directorate, Gosstandart

[Abstract] A scheme developed at the Kiev Information-Computing Center for interfacing the Akkord-1200 data transmission equipment with the YeS9002 magnetic tape preparation device is described. This provides the capability of augmenting the existing data processing equipment serving data transmission equipment with two YeS9002 devices, one for inputting data to the transmission equipment, and the other for output. The interface device performs logical matching of the data transfer signals of the Akkord-1200 and the YeS9002, plus electrical matching of the data signal and transfer signals of these devices. The interface device employs series-155 microcircuits incorporated in a separate standard replacement element which fits in an available space in the YeS9002. The interface device consists functionally of a magnetic tape read assembly and a write assembly, each of which operates separately. The circuit diagram of the device is presented and analyzed. Figures 1.
[62-6900]

UDC: 656.254.16:621.396.6.004

REPAIR AND ADJUSTMENT OF PR11 AND VXW100 RADIOS

Moscow AVTOMATIKA, TELEMEXHANIKA I SVYAZ' in Russian No 9, Sep 84 pp 33-37

LAPSHIN, B. M. and BREZGUNOV, V. T., senior engineers, Central Communications Station, Ministry of Railroads (TsSS MPS)

[Abstract] The circuit arrangement, board layout, repair and adjustment of the Czech-produced PR11 and VXW100 portable radios are described. Both radios support two-way simplex radiotelephone communications in the 150-174 MHz band

without tuning or searching. These systems provide a maximum of eight high-frequency channels with 25-KHz separation between adjacent channels. The radios employ frequency modulation and crystal frequency stabilization; the equipment is fully transistorized. The design, operation and adjustment of the transceiver, power supply and manipulator are described. The basic technical specifications of the transceiver are presented. A list of necessary test equipment is provided. The main boards in the receiver and transmitter of each radio are described in detail. Procedures are explained for checking the frequency deviation of the transmitter, tuning the first local oscillator of the receiver and measuring basic radio parameters. Figures 10; tables 1.
[62-6900]

UDC: 656.254.151:62-192

IMPROVING OPERATING RELIABILITY OF YeSK 400Ye TELEPHONE EXCHANGES

Moscow AVTOMATIKA, TELEMEXHANIKA I SVYAZ' in Russian No 9, Sep 84 pp 6-11

KHRAMCHENKOV, S. I., senior engineer, Automation, Remote Control and Communications Laboratory, Pribaltiyskaya Railroad

[Abstract] A group of technical modifications developed at the Automation, Remote Control and Communications Laboratory of the Pribaltiyskaya Railroad directed toward improving the operating reliability of the YeSK 400Ye automatic telephone exchange is described. The purpose of the modifications is to overcome the common exchange-wide malfunctions resulting from component failures (relays, diodes) or wiring defects (cold-soldered joints). Exchange reliability is improved by incorporating "parallel-indirect load distributors" in the seizure priority distributor circuits of the cord complexes, the incoming connector complexes and incoming registers, and by placing an automatic program request interrupt circuit in the incoming connector selector circuits. The parallel-indirect distributors permit the exchange to continue operating even in the case of group failures with all cord complexes or outgoing connectors in a particular rack malfunctioning. When this happens, seizure priority is transferred to the devices in the next rack in the row after a 5-second technical delay. The proposed technical treatments prevent outages caused by malfunctioning components in practically any module, except the central controller. They also make it easier to trace and repair problems in central controller modules. The operation of the proposed circuits is described in detail, and installation recommendations are given.
[62-6900]

ENERGY CHARACTERISTICS OF A VOICE SIGNAL AMPLIFIER

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 8, Aug 84 (manuscript received, after revision, 19 Dec 83) pp 82-83

GOREVA, T. A. and KIBAKIN, V. M.

[Abstract] The efficiency of the output stage of a voice amplifier is calculated for an amplifier operating in the class B mode with nearly zero residual voltage at its transistors. A speech signal is regarded as a continuously-discrete random process with given probability density of instantaneous magnitudes, its intelligibility remaining almost undiminished unless the amplitude limitation exceeds typically 16-18 dB. Input power and output power are normalized to a unit load, for subsequent comparative evaluation of actual and the maximum attainable efficiency under conditions of amplitude clipping. Tables 1; references 5: 4 Russian, 1 Western.
[58-2415]

RECEPTION OF SIGNAL WITH UNKNOWN AMPLITUDE AND DURATION SUBMERGED IN WHITE NOISE

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 8, Aug 84 (manuscript received, after revision, 30 Nov 83)
pp 28-34

TRIFONOV, A. P. and BUTEYKO, V. K.

[Abstract] A maximum-likelihood receiver is considered for extraction of a radio signal with a rectangular envelope of unknown amplitude and duration from white noise. After the probabilities of false alarm and missed hit have been calculated, for determining the detection characteristics of such a receiver, both amplitude and duration are estimated using the logarithm of the maximum-likelihood functional. The receiver is suitable not only for coherent processing but also for noncoherent processing in the case of high signal-to-noise ratio. The validity of simple approximate expressions for both detection errors and for the joint amplitude-duration distribution density with corresponding dispersions of estimates and their correlation coefficient has been verified by statistical modeling of the receiver on a digital computer with readings of the logarithm of the maximum-likelihood functional. Figures 5; references: 7 Russian.
[58-2415]

USE OF BIGAUSSIAN APPROXIMATION TO DESCRIBE FADING IN SCATTERING COMMUNICATIONS CHANNEL

Moscow RADIOTEKHNIKA in Russian No 9, Sep 84 pp 87-88

SUSHKOVA, L. T., MARCHENKO, Ye. Ya. and BRYKSIN, V. V.

[Abstract] An algorithm is presented for the analytical description of the statistical properties of fading in a scattering radio channel. Two Gaussian random processes $W_1(x)$ and $W_2(x)$ with parameters $a_1, \sigma_1, a_2, \sigma_2$, respectively where a_1, σ_1 - mathematical expectation and variance of initial normal processes), as the expression approximating the arbitrary probability density $W^*(x)$ of the composition (with weights $\lambda_1 = 1 - \lambda_2$) are considered. A graph analytical method is proposed for estimating the parameters a_1, a_2, σ and λ from the known estimates of the moments of the empirical distribution described. The proposed method is used to describe the real statistics of signal level variation in a tropo scatter radio channel as an example.
[44-6900]

MACHINE ANALYSIS OF RESONANCE CHARACTERISTICS OF PLATE-TYPE RADIO ELECTRONIC EQUIPMENT CONSTRUCTIONS

Moscow RADIOTEKHNIKA in Russian No 9, Sep 84 pp 94-95

TARTAKOVSKIY, A. M.

[Abstract] This study examines the numerical solution of the problem of finding the lower natural frequencies and forms of flexural oscillations of plate-type constructions (printed circuit boards, screens, etc.) for any manner of securing and with allowance for irregular distribution of components and parts with respect to mass over the plate. The problem is solved by the finite-difference method, in which difference analogs of the equation of the technical theory of plate flexure and boundary conditions are constructed for a certain grid region. An iterative process is derived for calculating the actual form and frequency. A program for automatic preparation of source data, and another for calculating the natural frequencies and forms, have been developed in accordance with the algorithm. An example of calculating the first two intrinsic forms and natural frequencies of boards containing components fastened at 4 and 5 points is presented.
[44-6900]

COMPUTING CONVOLUTION OF MULTIFREQUENCY SIGNAL EMPLOYING TRUNCATED FAST FOURIER TRANSFORM ALGORITHMS

Moscow RADIOTEKHNIKA in Russian No 9, Sep 84 (manuscript received 7 Sep 83)
pp 53-56

SYSOYEV, V. U.

[Abstract] The use of fast Fourier transform algorithms for computing the discrete Fourier transform and its inverse for multifrequency signals (signals employing step frequency modulation) is analyzed. The use of truncated FFT algorithms to eliminate redundant computations associated with finding unneeded spectral samples is explained. The number of multiplications is found as a function of the number of non-zero samples of the discrete spectrum of a signal for $N = 256$ and $N = 300$ assuming that non-zero samples follow one another in the spectrum. Ordinary FFT algorithms require 2,048 multiplications for $N = 256$ and 3,600 for $N = 300$. It is found for the truncated version that there is a significant range of numbers of non-zero samples for which truncated algorithms provide a significant reduction in the number of operations. It is noted that for certain relative positioning of non-zero samples in the spectrum the benefit is increased significantly. Figures 1; references 4: 3 Russian, 1 Western (in Russian translation).
[44-6900]

SYNTHESIS OF QUASI-OPTIMUM ALGORITHMS FOR SIGNAL RECOGNITION AGAINST BACKGROUND OF CORRELATED NOISE EMPLOYING DISCRETE SPECTRAL TRANSFORMATIONS

Moscow RADIOTEKHNIKA in Russian No 9, Sep 84 (manuscript received 11 Nov 83, after revision) pp 58-61

ROG, A. I., SIROTA, A. A., KHOKHLOV, E. N. and TUKHVATULIN, V. V.

[Abstract] A method is proposed for comparative estimation of the information capabilities of various discrete spectral transformations for recognizing signals in the presence of correlated noise. The approach can be used to construct a probability-recognition time relationship in which the individual points correspond to decision-making algorithms with the same operating structure, different only in the use in type of discrete transformation performed in advance. This relationship can be used to determine the need for using a transformation and to select said transformation to satisfy the restrictions regarding the complexity and speed of the recognition algorithms. Fourier and Walsh, as well as other computationally economical transformations, can be used. Figures 1; references: 5 Russian (1 concerned with foreign electronics).
[44-6900]

PROBABILITY OF DETECTION OF PULSED SIGNALS EMPLOYING ZERO-GATING INTERFERENCE SUPPRESSION

Moscow RADIOTEKHNIKA in Russian No 9, Sep 84 (manuscript received 29 Nov 83, after revision) pp 61-63

IVANOV, Yu. D.

[Abstract] A compensation method is presented which can be used to extract a pulse signal from a mixture of signal and continuous interference which combines a compensator and zero-gating interference suppression device. The noise suppression device consists of a zero counter and an analog switch with voltage applied to its input. The switch opens only when the interference is zero. The blanking pulse is so short that the interference voltage during the pulse can be disregarded. The probability of pulse signals coinciding with interference nulls is investigated, assuming that the interference levels in the primary and auxiliary channels are different, but that the nulls coincide. The false alarm probability is investigated, and a formula is derived for the maximum correct detection probability which can be realized.

References: 5 Russian.

[44-6900]

NEW CONVOLUTION AND DISCRETE FOURIER TRANSFORMATION ALGORITHMS BASED ON RECTANGULAR TRANSFORMATIONS OVER FIELD OF ROOTS OF UNITY

Moscow RADIOTEKHNIKA in Russian No 9, Sep 84 pp 66-68

BAYKOVA, A. T.

[Abstract] Effective methods are examined for computing the cyclic convolution and discrete Fourier transform of long and multidimensional sequences employing cyclic convolution of short sequences as base operations. The algorithms for the latter operations are orthogonal rectilinear transformations obtained by computing the residue of the product of the corresponding polynomials of degree $(N - 1)$ and the absolute value of the polynomial $Z^N - 1$, where N is the convolution length. The case of expansion of the field of rational numbers to the field of the roots of the N th power of unity for simple N is examined. The number of actual operations required for complex multiplication over the field in question is tabulated for $N = 3, 5, 7$; the maximum number of sequences which can be processed simultaneously is $N - 1$. It is found that the effectiveness of the new algorithms increases as the dimensionality and length of the transformed sequence. Tables 2.

[44-6900]

RECEPTION NOISE IMMUNITY OF MULTIPOSITION SIGNALS

Moscow RADIOTEKHNIKA in Russian No 9, Sep 84 pp 68-69

GIRSHOV, V. S.

[Abstract] The noise immunity of coherent reception of signals employing multiple phase modulation, and of optimum noncoherent reception of signals employing multiple phase-difference modulation, is analyzed for channels with fixed parameters and white noise for a Gray keying code. Formulas are derived for the error probability in k-tuple phase modulation and for k-tuple phase-difference modulation. The findings are particularly valuable when the signal energy to spectral noise power density ratio is relatively small, in which case the existing approximate relationships are too rough. Figures 1; references: 1 Russian.

[44-6900]

NOISE TOLERANCE OF DIVERSITY RECEPTION IN FREQUENCY-ADAPTIVE DIGITAL TRANSMISSION SYSTEMS

Moscow RADIOTEKHNIKA in Russian No 9, Sep 84 (manuscript received 9 Nov 83) pp 35-37

LESMAN, M. Ya. and TUKH, G. Sh.

[Abstract] This study investigates the influence of inaccurate estimation of the signal-to-noise ratio on the mean error probability in a frequency-adaptive digital transmission system employing space-diversity reception. The system operates by combining M spatially-separated signals and analyzing the equivalent signal-to-noise ratio for each of the N frequencies allocated for communications. The best frequency (in terms of the maximum signal-to-noise ratio at the output of the combining device) is sent back to the transmitter over the feedback channel, so that the signal can be emitted at the optimum frequency. The analysis assumes that signal feeding in the diversity branches is statistically homogeneous and mutually independent; additive interferences are approximated by normal white noise. It is found that the mean error probability is a strong function of the accuracy with which the signal-to-noise ratio is estimated (sample size n); for $n = (5 - 6)N$ this probability is the same as that of a hypothetical system in which the average signal-to-noise ratio in any of M statistically homogeneous diversity branches is assumed to be known. When the sample is large, doubling the number of frequencies allocated does not reduce the mean error probability significantly. The effectiveness of systems belonging to this class is extremely sensitive to delay in executing frequency tuning commands from the controller. The authors thank R. E. Gut for a benevolent attitude and

assistance during consideration of the formulation of the problem and the results obtained. Figures 2; references: 7 Russian.
[44-6900]

UDC: 621.391.82

ANALYSIS OF INTERFERENCE CAUSED BY INTERFERING RADIO SIGNALS IN COMMUNICATIONS SYSTEMS WITH FREQUENCY SEPARATION OF TELEPHONE CHANNELS AND FREQUENCY MODULATION

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 9, Sep 84 (manuscript received 31 Jan 84, after revision) pp 61-62

KALASHNIKOV, N. I. and STEPANOV, A. P.

[Abstract] Analytical formulas are derived which can be used directly to find the interference level caused by an interfering radio signal in a telephone channel at the upper portion of the group spectrum, as well as the highest interference value in any telephone channel. Formulas are derived for the signal voltages at the input to the receiver, the interference power at the output of the frequency detector and the spectral power densities of the valid and interfering radio signals. The concept of an interference attenuation factor is introduced: this factor relates the ratio of the power of the measurement signal in the circuit of the valid signal and the interference at the output of the telephone channel with the ratio of the power of the valid and interfering signals at the receiver input. References: 3 Russian.
[61-6900]

UDC: 621.391.8

INVESTIGATION OF INFLUENCE OF COMMUNICATIONS LINK AND SYNCHRONIZATION ERROR ON NOISE TOLERANCE OF GROUP TRANSMISSION OF BINARY INFORMATION BASED ON ORTHOGONAL WALSH FUNCTIONS

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 9, Sep 84 (manuscript received 13 Jul 83) pp 28-32

VERSHININ, V. A. and LANDO, V. S.

[Abstract] The influence of the communications link and the synchronization error on the noise tolerance of a modem for group transmission of binary information based on orthogonal Walsh functions (by finding the probability of incorrect reception of a message binary code element) is investigated. The influence of the link and synchronization error are analyzed on the basis of the transient response of the communications link. An example is presented in which the number of interfering pulses over the processing interval is described by a Poisson distribution. It is found that group transmission is

more noise tolerant than serial transmission when pulse interference is present. The lower the level of interference consisting of normal noise, the greater the gain in noise tolerance. The influence of the communications link and synchronization error becomes more significant as the number of binary code elements increases because of reduced influence of pulse interference. Figures 3; references: 6 Russian.
[61-6900]

UDC: 621.391.2

APPROXIMATE RULES FOR SIGNAL DETECTION AGAINST BACKGROUND OF GAUSSIAN
CORRELATED INTERFERENCE

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 9, Sep 84 (manuscript received 27 Jul 83) pp 14-19

FROLUSHKIN, V. M.

[Abstract] Two approximate signal detection rules for the case of a correlated Gaussian interference background with unknown signal and interference parameters are proposed. The first is for the case in which the occurrence of a signal causes the mathematical expectation of the input to be non-zero; the other is for the case in which the signal changes the variance of the input. The proposed rules represent optimum procedures for detecting signals in white Gaussian noise, modified for detection in the presence of correlated interference. The proposed rules depend upon only one additional unknown parameter - the effective number of degrees of freedom. Signal detectors employing these principles are clearly simpler than detectors which estimate each unknown element of the correlation matrix. An analogous approach is likely to achieve positive results for non-Gaussian distributions as well. Figures 1; references 9: 7 Russian (1 concerned with foreign radio electronics), 2 Western.
[61-6900]

UDC: 621.372.061

USE OF IMPORTANCE SAMPLING TO INVESTIGATE SIGNAL DETECTION SYSTEMS BY
SIMULATION METHOD

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 9, Sep 84 (manuscript received 24 Feb 84, after revision) pp 8-14

KUZ'MIN, S. Z. and KOSTINA, S. S.

[Abstract] The use of importance sampling for investigating signal detection systems by simulation employing only a posteriori information about the

response of the system to a given input is examined. In the importance sampling method, the initial input is replaced in the simulation by a modified input, after which is replaced in the simulation by a modified input, after which the system response is corrected by the appropriate weight coefficient. The input is modified such that the detection probability for a given accuracy is estimated according to the smallest possible number of experiments. The case is considered in which the set of modified inputs includes the probability density of which differs from that of the original input only in the values of the parameters $f_{\text{mod}}(x, a) = f(x, a_{\text{mod}})$. The number of experiments required to achieve the required accuracy in estimating the probability in direct modeling and in modeling employing modified inputs is calculated. Estimation of small false alarm probabilities with uncorrelated Rayleigh-distributed samples of a noise envelope input to the system is investigated as an example. It is found that the importance sampling method makes it possible to estimate small false alarm probabilities with an acceptable number of trials. Tables 1; references 5: 4 Russian, 1 Western. [61-6900]

UDC: 621.391.2

NOISE IMMUNITY OF INFORMATION TRANSMISSION SYSTEM WITH PSEUDORANDOM
FREQUENCY SWITCHING UNDER WORST-CASE INTERFERENCE CONDITIONS

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 9, Sep 84 (manuscript received 5 Mar 84, after revision) pp 3-8

CHUDNOV, A. M.

[Abstract] A method is proposed for analyzing the noise immunity of data transmission systems employing pseudorandom frequency switching for worst-case distribution of interference by frequencies. The problem is formulated as a minimax game problem of synthesizing counteracting dynamic systems. The effectiveness of the transmission system is defined by its noise immunity, represented by the average error probability. The optimum interference strategy is assigned by finding the distribution function of the interference by frequencies. The noise immunity of a pseudorandom frequency-switching transmission system in which information is transmitted at each frequency by phase-shift keyed pseudorandom (wideband) signals, employing coherent processing in the receiver, is estimated as an example. References 9: 8 Russian, 1 Western. [61-6900]

UDC 621.316.933.002.25

STABILITY OF HIGHLY NONLINEAR OXIDE-ZINC RESISTORS UNDER CONTINUOUS VOLTAGE
OF INDUSTRIAL FREQUENCY

Moscow ELEKTROTEKHNIKA in Russian No 9, Sep 84 (manuscript received 10 Aug 83)
pp 25-28

DEM'YANENKO, K. B., candidate of technical sciences, and SERGEYEV, A. S.,
candidate of technical sciences, Scientific-Research Institute of Industrial
Association "Elektrokeramika" (Electrical Ceramics)

[Abstract] An experimental study of ZnO resistors for high-voltage overvoltage limiters without spark gaps was made, the purpose being to determine the dependence of their aging rate on the applied voltage and on the ambient temperature as well as on their initial current-voltage characteristic. Tests were performed on 150 strings of 10-15 resistors 28 mm in diameter each, connected in series and inserted in a thermosetting polyethylene tube. These strings were tested for a cumulative time of 115,000 hours with the ambient temperature varied from 0°C to 75°C and with the amplitude of the continuous voltage at 50 Hz frequency varied from 58% to 76% of the residual voltage after application of a 100 A current pulse of 8/20 μ s duration, the nominal operating voltage varying from 45% to 55% of that residual voltage. Their nonlinearity factor within the 10^{-5} - 10^{-4} A range and the 10^{-4} - 10^{-3} A range of current, their capacitance and their physical height were measured before and after the tests. The voltage gradient along the resistor strings was calculated and the strings were assembled so as to make the mean electric field intensity at an 100 A current equal to 1.65 ± 0.02 kV/cm with a variance not exceeding 5%. Measurements also included the thermal resistance, remaining fairly constant within the 50-70°C·cm/W range throughout, and the power-voltage characteristic. An evaluation of the results has yielded an empirical relation for the active power dissipated in such a resistor as an exponential function of the applied voltage V_0 (e^{aV_0}) and an exponential function of the ambient temperature T_0 (e^{-b/T_0}). Accordingly, the aging process was found to have three stages: 1) initial transient buildup of aging rate; 2) power rising as linear function of time; 3) power rising faster than resistor temperature, following loss of thermal balance and stability. The critical resistor power at which the third stage begins is approximately 1 W/cm at a resistor temperature 50-70°C above ambient. An empirical relation for the aging rate is derived on this basis, including a voltage parameter which characterizes both current-voltage and power-voltage relations in the resistors. Figures 7; references 4: 3 Russian, 1 Western.

[64-2415]

ELECTRODYNAMIC STABILITY OF COMPOSITE LIQUID-METAL CONTACTS

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA
in Russian No 8, Aug 84 pp 76-81

BRON, OSIP BORISOVICH, meritorious activist in science and engineering in the RSFSR, doctor of technical sciences, professor; and
BELYAYEV, VLADIMIR L'VOVICH, graduate student, Northwestern Polytechnical Correspondence Institute

[Abstract] A study was made of composite liquid-metal contacts which included microstructural analysis of the material and electrodynamic tests, the contacts in this study consisting either of cloth or fine-grain filler impregnated with liquid Ga-In-Sn alloy between two hard-metal electrodes. Microstructural analysis was performed with a universal photomicrograph under x50-100 magnification. The results reveal wetting patterns in air and between electrodes, immediately after impregnation and over subsequent periods of time ranging from a few days to several months. Seven different electrode pairs were used, made respectively of copper with rough finish, copper with fine finish, tinned copper, brass with rough finish, brass with fine finish, brass mesh, and glass cloth for comparison. The results indicate that, regardless of material and surface finish, complete wetting does not occur immediately but gradually, with attendant increasing of the true contact area and correspondingly decreasing contact resistance. Electrodynamic stability was established on the basis of measurement of bounce forces during closure and under heavy short circuit. A correlation of experimental data with theory reveals that electrodynamic bounce forces are so much smaller in composite liquid-metal contacts than in hard-metal contacts as to be negligible for all practical purposes. Figures 5; tables 1; references 5: 3 Russian, 2 Western (1 in Russian translation).
[52-2415]

UDC: 621.372.061

PLANAR FERROELECTRIC MICROCAPACITORS FOR MICROWAVE DEVICES

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 9, Sep 84 (manuscript received 11 Mar 84, after revision) pp 83-84

GUBLER, M. I., KEYS, V. N., MALYSHEV, M. N. and TER-MARTIROSYAN, L. T.

[Abstract] Microcapacitors based on $(\text{Ba}_{0.6}, \text{Sr}_{0.4})\text{TiO}_3$ ferroelectric films obtained by high-frequency reactive sputtering of a three-dimensional target in an oxygen atmosphere onto a substrate of single-crystal magnesium oxide are investigated. The structure of the films was determined by the substrate of single-crystal magnesium oxide are investigated. The structure of the films was determined by the substrate, as well as the thermodynamic and kinetic

characteristics of the process by which the condensate was formed: the pressure of the oxygen, the temperature of the substrate and the power of the high-frequency discharge. The parameters of the microcapacitors were measured at approximately 10 GHz by the resonator method at temperatures ranging from -100 to +100°C. The tangent of the loss angle of the microcapacitors was found to depend strongly upon the temperature and the fixed bias voltage, indicating a relatively high concentration of defects in the ferroelectric film. The voltage-capacitance characteristic and coefficient of nonlinearity of the microcapacitors were analyzed. It is found that the characteristics of these capacitors permits them to be used in technical applications. Performance can be achieved by improving the film structure, reducing the concentration of defects and making the transitional layer thinner. Figures 1; references: 2 Russian.

[61-6900]

UDC: 681.325.5-181.4

ORGANIZATION OF COUPLING OF MICROPROCESSOR WITH STORAGE DEVICES

Moscow AVTOMATIKA, TELEMEXHANIKA I SVYAZ' in Russian No 9, Sep 84 pp 23-25

SOROKIN, B. L. and YABLONSKIY, S. A., candidates of technical sciences, senior scientific associates, Leningrad Order of Lenin Institute of Railroad Transportation imeni Academician V. N. Obratsov (LIIZhTa)

[Abstract] This article, one of a series, deals with the basic problems of the control of on-line storage (OLS) and permanent storage (PS) devices in the design of microprocessor systems. The operation of the address bus in the KR580IK80A microprocessor is examined as an example. Diagrams are presented to illustrate interfacing, the organization and interfacing of storage with buses using decoders and OLS and PS large integrated circuits (LIS) with one inverting chip select input. Simplification of addressing schemes by using a memory LIS with several chip select inputs is explained. Some practical recommendations on setting up coupling of microprocessors and storage are given. Figures 5; tables 1; references 4: 3 Russian, 1 Western (in Russian translation).

[62-6900]

UDC 62-60

FOURIER TRANSFORMATION EXECUTOR BASED ON K580 MICROPROCESSOR

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 27, No 8, Aug 84 (manuscript received, after completion, 2 Nov 83) pp 86-87

YEGOSHIN, A. V., MAL'GIN, Yu. Yu., TEREKHOV, S. A. and FURMAN, Ya. A.

[Abstract] The K589 high-speed microprocessor produced in the USSR can be used for executing one-dimensional and two-dimensional discrete Fourier and discrete inverse Fourier transformations. Such a special-purpose 16-bit microcomputer contains an arithmetic-logic unit, a carry look-ahead unit, a microprogram control unit, a 1 K microprogram memory, a 12 K direct-access memory for programs, addresses, constants and codes, and a digital receptor

array. The device can do: 1) one-dimensional 128-point fast Fourier and fast inverse Fourier transformations, with subsequent calculation of energy spectra and correlation functions; 2) two-dimensional fast Fourier transformation, with subsequent construction of digital 128x128 hologram arrays; 3) discrete Fourier transformation for image contours on the basis of their chain codes. Figures 2; references 5: 2 Russian, 3 Western (2 in Russian translation).
[58-2415]

UDC: 681.325.5-181.4

TEST EQUIPMENT FOR K580IK80-BASED MICROPROCESSOR SYSTEMS

Moscow RADIOTEKHNIKA in Russian No 9, Sep 84
(manuscript received 3 Oct 83, after revision) pp 69-71

KANINSKIY, V. A. and TESLYUK, A. F.

[Abstract] A test system for K580IK80 microprocessors incorporating an automated workstation and an interface module on the base of a SM-3 computer is described. The interface module serves as an embedded K580IK80 microprocessor emulator with the necessary test equipment. Structural diagrams of the test complex are presented and explained. When testing is underway, the developer can control and follow the process on the workstation display. The use of the system reduces microprocessor system hardware and software development time as much as three-fold. Figures 4; references: 3 Russian.
[44-6900]

UDC: 621.391.17:681.3

MICROPROCESSOR CONTROLLER FOR IMPLEMENTING ALGORITHMS FOR ADAPTIVE RADIO SIGNAL PROCESSING IN ANTENNA ARRAYS

Moscow RADIOTEKHNIKA in Russian No 9, Sep 84 (manuscript received 11 Oct 83)
pp 72-73

GORODILIN, V. V. and GLUSHANKOV, Ye. I.

[Abstract] A microprocessor controller is presented which implements adaptive processing algorithms for radio signals in antenna arrays in which nulls are formed in the directivity pattern in the direction of arrival of interference and a maximum is formed in the direction of arrival of the valid signal. The controller is based on a K584-series large integrated circuit complex. Two schemes are presented for interfacing the controller and the analog elements of the array, one for four or fewer elements, and the other for more elements. Figures 3; references: 6 Russian.
[44-6900]

DIGITAL COMPUTER SAMPLE SYNTHESIZERS WITH MINIMUM MEMORY

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 9, Sep 84 (manuscript received 14 Feb 84, after revision) pp 64-66

FADEYEV, A. N.

[Abstract] Digital sample synthesizers are examined in which the read-only memory used to store the sinusoid samples is made as small as possible. The level of the side components of the synthesized oscillations is estimated. Two algorithms are presented for computing the samples of harmonic functions which can be used to achieve low digitization noise levels for the case of a large discrete set of frequencies. A sample synthesizer incorporating a digital-analog converter operating in a Walsh function basis can form spectrally pure signals only when a small number of frequencies is used; otherwise it is difficult to obtain side component levels better than 40 dB in such synthesizers. Figures 1; references 8: 7 Russian, 1 Western (in Russian translation).

[61-6900]

PRINCIPLES OF SYNTHESIS OF FUNCTIONALLY RESERVED AUTOMATIC CONTROL SYSTEMS

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE
in Russian Vol 27, No 9, Sep 84 pp 21-30

SOLODOVNIKOV, V. V. and TUMARKIN, V. I., Moscow Higher Technical Training
School imeni N. E. Bauman

[Abstract] A viability criterion is formulated for functionally reserved automatic control systems employing a principle of limited complexity. The systems in question are reserved in that in the event of a failure of the subsystem which performs the main control task, another subsystem takes over that task, although perhaps with slightly inferior performance. The dynamic reserve criterion is explained, and the dynamic characteristics of reserved dynamic systems, logically dynamic systems and reserved stationary control systems with infinite memory are analyzed. A ship navigation problem employing an automatic control system is analyzed as an example. Figures 2; tables 1; references 5: 4 Russian, 1 Western (in Russian translation).
[60-6900]

ELECTRICAL INSULATION

UDC 621.01.001+621.312+621.316.34

OPTIMIZATION OF OVERALL DIMENSIONS OF ENCLOSURES FOR LOW-VOLTAGE DEVICES AND EQUIPMENT

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA
in Russian No 8, Aug 84 (manuscript received, after completion, 7 Dec 82)
pp 95-101

ZEKTSER, DAVYD MARKOVICH, candidate of technical sciences, and
KLIMENKO, BORIS VLADIMIROVICH, candidate of technical sciences, docent,
Kharkov Polytechnical Institute

[Abstract] The problem of optimizing the overall three dimensions of enclosures for low-voltage equipment from the standpoint of wall (insulation) material economy is regarded as one of minimizing the volume or the mass of enclosure material rather than of the surface area. This treatment applies where mechanical and thermal stresses determine the minimum wall thickness. In the ideal case where all three dimensions of the parallelepiped are free to be varied, a cubical enclosure with all walls of the same thickness will require the least material. In practical design situations, however, some dimensions are fixed. In one typical case one dimension is fixed by the modulus of elasticity or shear. Here, for a given volume of equipment and thus a given capacity of the enclosure, the latter with the two other dimensions equal and thus having a pair of square parallel walls, will require the least material. This recommendation has been followed by several Western manufacturers of automatic circuit breakers (AEG, Siemens, Klockner-Moeller, Burisch, Mitsubishi, Toshiba, Nikko Electric). In another typical case one dimension is fixed by constraints on the equipment configuration. Here, with the other two dimensions free to be varied, none of them depends on the wall thickness. This has been considered in the design of Soviet automatic circuit breakers such as the VA55-43 with overall dimensions 425x360x160 mm and wall thicknesses $\delta_x = 6$ mm, $\delta_y = \delta_z = 3$ mm. This design is based on a comparative evaluation against a cubical enclosure and an enclosure with square bases only. Figures 3; tables 3; references: 2 Russian.
[52-2415]

DIELECTRIC MEASUREMENTS IN INFRALOW-FREQUENCY BAND

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 9, Sep 84 (manuscript received 1 Nov 83) pp 94-96

BELOV, A. A., POTEMKIN, V. V. and SHCHETININ, M. V.

[Abstract] An instrument is described which is capable of recording quasi-static changes in the permittivity of materials at the $\Delta\epsilon' = \Delta\epsilon'' \approx 1 \cdot 10^{-5}$ level within a small portion of the infralow-frequency band over periods of three or four days. The device is based on a capacitive sensor employing a bridge arrangement. The structural diagram of the device is presented and analyzed. The sensitivity of the system is determined in two ways: by finding the combined gain and calculating the sensitivity in accordance with the change in current amplitude, and by changing the capacitance of one of the arms of the bridge a given amount by switching a pair of capacitors. Statistical processing of measurement results indicates that the minimally detectable change in permittivity at 0.05 Hz is $1.9 \cdot 10^{-6}$. The respective values at 0.1 and 0.5 Hz are $1.7 \cdot 10^{-6}$ and $0.8 \cdot 10^{-6}$. Figures 2; tables 1; references 11: 9 Russian, 2 Western (in Russian translation).
[61-6900]

UDC [621.039.6:621.3.038.6:621.318.3].045.048

WINDING INSULATION IN ELECTROMAGNETIC SYSTEMS FOR TOKAMAK REACTOR PLANTS

Moscow ELEKTROTEKHNIKA in Russian No 8, Aug 84 (manuscript received 27 Oct 83)
pp 35-38

MASLOV, V. V., candidate of technical sciences, and TRUBACHEV, S. G.,
candidate of technical sciences, VNIIEIM (All-Union Scientific Research
Institute of Electrical Insulation Materials)

[Abstract] Magnetic containment of the plasma in nuclear fusion reactors of the tokamak type requires electromagnets with insulation which must withstand high temperatures and thermal shocks as well as ionizing radiation in various forms and electric fields, and mechanical loads. The research program in the International Tokamak Reactor project includes evaluation of insulation materials to ensure adequate thermophysical and mechanical properties, followed by design of insulation systems with satisfactory performance characteristics. Data on neutron fluence-energy characteristics and radiation absorption doses during neutron interactions are essential for such an evaluation. Materials considered for insulation in electromagnets with superconductor and cryo-resistance windings are glass-mica tape with epoxy compound impregnation, glass cloth with epoxy compound impregnation (STE), polyimide-glass cloth with adhesive coating (LSNL), glass Textolite with epoxy-phenolic binder (STEN), epoxy resin paste with mineral fillers (PE), and polyurethane compound

modified by epoxy resin with mineral filler (KPU). The data accumulated so far indicate that phenolic varnish is best for turn insulation and slot lining, epoxy resin paste with mineral fillers is best for coil insulation, and glass Textolite with epoxy binder is best for filling "technological" voids. Use of epoxy-phenolic binder shortens the necessary heat treatment time and, by imparting excellent dielectric characteristics to the insulation system, reduces the necessary insulation thickness. Figures 2; tables 5; references 9: 7 russian, 2 Western (1 in Russian translation).
[51-2415]

UDC: 548.55:537.311.322

THERMALLY STIMULATED CONDUCTIVITY IN SEMI-INSULATING GALLIUM ARSENIDE

Vilnius LITOVSKIY FIZICHESKIY SBORNIK in Russian Vol 24, No 2, Feb 84
(manuscript received 20 May 83) pp 90-94

RINKYAVICHYUS, V. S. and KAVALYAUSKENE, G. S., Vilnius State University
imeni V. Kapsukas

[Abstract] Single crystals of semi-insulating chromium-compensated n-type GaAs with specific resistance on the order of $10^8 - 10^9$ Ohms·cm grown by the Chokhral'sk method are investigated. The specimens measured 1.2 by 0.35 by 0.1 cm³. Thermally stimulated thermal emf and thermally stimulated conductivity were investigated by repeated heating; thermally stimulated conductivity was investigated by the $T_m - T_{STOP}$ method, in which the thermally stimulated conductivity is measured after heating the excited specimen to a temperature of T_{STOP} . As T_{STOP} is gradually increased by 2 - 5K, a series of conductivity curves is measured, making it possible to establish the presence of several overlapping maxima. The activation energy of the adhesion levels of the holes and the capture cross-section of the charge carriers are determined. Four conductivity maxima are observed between 100 and 300 K which correspond to activation energies ranging from 0.14 to 0.29 eV and a capture cross-section of the order of 10^{-22} cm². The overlapping third and fourth maxima correspond to a 0.29 eV hole adhesion level with capture cross-sections differing by an order of magnitude. Figures 6; tables 2; references 8: 3 Russian, 5 Western.
[54-6900]

NON-SELF-MAINTAINED HIGH-VOLTAGE LOW-PRESSURE DISCHARGE

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 27, No 7, Jul 84 (manuscript received 23 Feb 83, after revision, 27 Feb 84) pp 925-933

BOLDASOV, V. S., KUZ'MICHEV, A. I. and FILLIPYCHEV, D. S., Kiev Polytechnical Institute

[Abstract] The characteristics of, and the physical processes underlying, a non-self-maintained high-voltage discharge occurring during the emission of electrons into a low-pressure space between flat metal electrodes are investigated. The discharge is studied in kinetic approximation for pressures equal to or greater than the critical pressure, with allowance for the movement of charged particles in the self-consistent field and the ionization of gas by cathode and secondary electrons, ions and fast neutrals which are formed when the ions are re-charged. The role of these processes is assessed, and the transmission of current through the gas-discharge space is analyzed. The conditions for the transition of low pressure discharges from one form to another are determined. The mechanism underlying the development of breakdown in thyratrons is clarified. The use of the discharge of a cathode with defined electron emission current makes it possible to analyze processes occurring at pressures greater than and less than the critical pressure, to determine the perveance of the high voltage interval for subcritical pressures, and the current of the transition to the plasma form for supercritical pressures. Figures 4; tables 1; references 24: 21 Russian, 3 Western (1 in Russian translation). [47-6900]

ANALYSIS AND DESIGN OF LINEAR MICROWAVE TRANSISTOR AMPLIFIERS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84 (manuscript received 23 Sep 82) pp 1555-1560

PETROV, G. V.

[Abstract] The characteristics of linear microwave amplifiers can be analyzed on the basis of S- or T-parameters of a four-pole network, with the noise factor calculated in terms of equivalent τ - or t -parameters. Here the corresponding system of two algebraic equations are formulated in parameters of the transmission (T and t) matrices. Their solution for gain and stability factor reveals that an absolutely stable or potentially unstable amplifier is possible, with passive matching circuits used in most cases. Three procedures for design of a transistor amplifier with thermal noise under a resistive load are shown: 1) amplifier with given noise factor and

unity voltage standing wave ratio at the output; 2) amplifier with given noise factor and minimum VSWR at both output and input; 3) amplifier with given gain and minimum VSWR at both output and input. All three design variants are illustrated with numerical data. Figures 2; references 7: 4 Russian, 3 Western.
[57-2415]

UDC 621.382.82.001

NUMERICAL SIMULATION OF INVERTERS WITH I^2L ELEMENTS INCLUDING EFFECTS OF HIGH DOPING LEVEL

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 8, Aug 84 (manuscript received, after revision, 17 Nov 83)
pp 16-22

ABRAMOV, I. I.

[Abstract] Numerical simulation of semiconductor structures, specifically I^2L inverters, is considered with the effects of high doping levels taken into account. The corresponding system of fundamental equations is solved for three models of bandgap narrowing: 1) Vol'fson-Subashiyev model for n-type doping and for p-type doping; 2) Lanyon-Taft model for n-type doping or p-type doping; 3) Slotboom-DeGraaff model for bipolar transistor. All these continuous models include degeneracy, impurity deionization, doping level dependence of charge carrier lifetime and Auger recombination coefficients, temperature changes, mobility and concentration changes in the base region. Simulation can accordingly be based on Boltzmann statistics with the aid of experimental data and disregarding the asymmetry of bandgap narrowing ($A = 0.5$), except in the Vol'fson-Subashiyev model, while Fermi statistics will contain the error of twice accounting for degeneracy. Calculations for multidimensional simulation of a unicollector I^2L inverter with the doping level $|N_g - N_a|$ reaching 10^{20} cm^{-3} under the collector center and 10^{18} cm^{-3} under the injector were made by the fast converging method of two-step vector relaxation written in FORTRAN-4 for a YeS computer. Figures 1; tables 2; references 28: 8 Russian, 20 Western.
[58-2415]

ELECTROTHERMAL TRANSDUCER WITH SHORT TIME CONSTANT

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 9, Sep 84 (manuscript received 1 Mar 84, after revision) pp 41-46

BOGDANOV, S. G. and BOGDANOVA, L. K.

[Abstract] The possibility is investigated of obtaining electrothermal transducers (devices which employ conversion of an input electrical signal in a resistive heat source to a heat flux, of the heat flux to the temperature of a working body, and conversion of the latter in a heat sensing element to an output signal) with minimal thermal inertia. The factors limiting the speed of electrothermal transducers are analyzed. A condition is derived for achieving the minimum thermal time constant which holds for any amount of heat release. It is shown experimentally that electrothermal transducers can have thermal time constants on the order of a few microseconds. It is shown through theoretical analysis and experimental measurements of static resistance to heat release that the condition for achieving the maximum thermal time constant is satisfied up to frequencies on the order of 1/MHz given the current level of technology, making it possible to expect the construction of transducers with time constants of 10^{-7} seconds. Figures 3; references: 4 Russian.

[61-6900]

UDC 621.384(088.8)

RELIABILITY OF DRIVE CONTROL SYSTEM WITH REDUNDANCY

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA
in Russian No 8, Aug 84 (manuscript received 3 Feb 83) pp 116-119

BULEKOV, VLADIMIR PAVLOVICH, doctor of technical sciences, professor,
Moscow Institute of Aviation, and KLYAGIN, VLADIMIR IL'ICH, engineer

[Abstract] The contribution of structural redundancy to the reliability of a drive control system is evaluated theoretically, considering specifically an irreducible control system containing n identical redundancy channels feeding into a common output device. Each redundancy channel consists of a functional device generating the control signal, a monitor which evaluates the state of that device, and a switch. The corresponding probability equation for a complete group of events is based on the appropriate relation for the probability of failure-free system operation over a given time interval. This equation is solved for any ratio of passive failures to active failures, assuming that simultaneous failure of two or more channels is unlikely, that a passively failing channel is disconnected (isolated) instantaneously, that directional action of an actively failing channel on the common output device is equiprobable at any point of the latter's operating line, and that the counterforce induced by an actively failing channel at the input of the common output device is not larger than the maximum force produced by an operative channel. The results can be used as basis for solving the forward problem: with the probabilities of failure-free operation of individual components in a redundancy channel known, determine the probability of failure-free operation of a control system having a fixed number of such redundancy channels. They can also be used for solving the reverse problem: with the probability of failure-free operation of a control system and the ratio of passive failures to active failures given, either determine the probability of failure-free operation which one redundancy channel must have when the number of channels is fixed or determine the necessary number of redundancy channels when the probability of failure-free operation of one channel is known. Figures 1; tables 1; references 3: 1 Russian, 2 Western.
[52-2415]

ADAPTIVE TUNING OF CONTROL SYSTEM FOR KEYING DEVICES

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: ELEKTROMEKHANIKA
in Russian No 8, Aug 84 (manuscript received 28 Mar 83) pp 72-76

SHTAKAN, VLADIMIR FEDOROVICH, candidate of technical sciences, senior instructor, and KURNOSOVA, SVETLANA NIKOLAYEVNA, junior scientific associate, Chelyabinsk Polytechnical Institute

[Abstract] Control of a keying device is considered with rms error as the optimality criterion. A typical application is a linear tracking system with "clipping by saturation" nonlinearity on the input side, describable by an n-order differential equation $\dot{x} = Ax + B\phi(u)$ (x - n-dimensional state vector, $y = Cx$ - output signal, u - scalar input signal with program component u_0 , A - unknown constant $n \times n$ Hurwitz matrix, $B = [0, \dots, 0]^T$ - $n \times 1$ control matrix, $C = [1, \dots, 0]$ - $1 \times n$ observation matrix, nonlinearity function

$\phi(u) = \begin{cases} u & \text{for } u < u_0^* \\ u_0^* & \text{for } u = u_0^* \end{cases}$. The system or, more precisely, its transfer ratio

is adaptively tuned through feedback, with the functional $J = 1/2 \int_{t_0}^T q(y - u_0)^2 dt$

($q > 0$) as the performance quality criterion. The adaptation algorithm constructed on this basis has been checked by simulation on a digital computer for a second-order tracking system with transfer function $W(p) = 1/(1 + 0.1p + 0.25p^2)$ and program component of input signal $u_0(t) = 0.2\text{sign}(\sin 0.8\pi t + 0.2\sin 4\pi t) + 0.2\sin 4\pi t + 0.5\sin 0.2\pi t$. Figures 3; references: 4 Russian. [52-2415]

UDC 681.518.42

CURRENT LIMITING IN WIDEBAND POSITION CONTROL SYSTEM WITH TRIPLE INTEGRATION WITHOUT VELOCITY CONTROL LOOP

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: ELEKTROMEKHANIKA
in Russian No 8, Aug 84 (manuscript received 6 Apr 83) pp 62-69

GUL', AL'BERT IGNAT'YEVICH, senior scientific associate, Ukrainian Polytechnical Correspondence Institute

[Abstract] A high-speed precise position control system with triple integration and without subordinate velocity control is proposed for electric drives, specifically a linear d.c. motor with transistor pulse amplifier driving a slide valve. The system also includes, in addition to two integrators converting the transient armature current into velocity and into displacement, respectively, a PDI position regulator in a 3-1-2 configuration.

The main advantage of such a position control system without a velocity control loop is its maximum attainable bandwidth covering natural vibrations of the mechanical system (armature - load - position sensor). The second advantage is its third-order astatism relative to the load, particularly desirable when stickiness wipes out the valve clearance. The control system also includes current limiting by means of an "insensitivity zone" built into the current feedback loop in the PD part of the PDI regulator. Amplitude-phase-frequency characteristics have been calculated and the corresponding hodograph has been plotted for an asymmetry factor $a=\sqrt{5}$, which corresponds to a closed-loop system with resonance peak and maximum attainable bandwidth. They indicate absolute stability during overregulation "in the small" such as near the symmetric optimum, provided the current limitation is infinitely stiff. Figures 4; references: 3 Russian.

[52-2415]

UDC: 001.2:62-52:66.012-52

COMPUTER AIDED DESIGN OF AUTOMATIC CONTROL SYSTEMS FOR MULTIDIMENSIONAL CHEMICAL-TECHNOLOGICAL OBJECTS

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE
in Russian Vol 27, No 9, Sep 84 pp 91-96

PEROV, V. L., TURKATOV, S. A. and KHABARIN, A. Yu., Moscow Chemical-Technological Institute imeni D. I. Mendeleev

[Abstract] The method of multidimensional inverse frequency characteristics (inverse Nyquist hodographs) is extended to the case of complex systems described in terms of block transfer matrices. A complex chemical technological system which can be decomposed into a number of interconnected subsystems is examined. A control system structure is proposed which incorporates the object, a pre-compensator, a system of single-loop regulators and feedback. The multiply-connected subsystems are decomposed into a series of weakly interacting unidimensional loops which are controlled by commercial regulators with standard control principles. An algorithm and software are developed for a computer aided design system for multiply-connected control systems. The software incorporates a subsystem for computer aided modeling of the dynamics of complex chemical technological systems, a subsystem for generated technical documentation, an interactive subsystem and a databank control subsystem. Figures 1; references 10: 7 Russian, 3 Western.

[60-6900]

UDC 681.51/54:681.3-181.48

MICROCOMPUTER SIMULATION OF CALCULATOR-OBSERVER OF STATE VECTOR OF
ELECTROMECHANICAL SYSTEMS

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA
in Russian No 8, Aug 84 (manuscript received, after completion, 14 May 84)
pp 40-45

KONOVALOV, SERGEY ALEKSANDROVICH, engineer, NIKITENKO, YURIY ALEKSANDROVICH,
candidate of technical sciences, assistant, Novocherkassk Polytechnical
Institute, TUSHKANOV, NIKOLAY BORISOVICH, assistant, Novocherkassk Polytechnical
Institute, and NIKULICHEV, ALEKSANDR YUR'YEVICH, student, Novocherkassk
Polytechnical Institute

[Abstract] An observing device capable of calculating the variable state vector of an electromechanical object from partial measurement is simulated digitally on an "Elektronika-60" microcomputer, as an alternative to less expedient analog simulation. The algorithm of this simulation is constructed so as to facilitate tuning and synthesis of object control from estimates of the object's coordinates on the basis of accelerometer and tachometer readings. The original analog observer structure includes two integrators and in its digital model there appears a multiplier which removes the "dead zone" effect of analog-to-digital conversion at less than microcomputer capacity. This digital model must be optimized for calculation of transients, which cannot be done by approximation to canonical digital devices and requires either analysis of unwieldy relations or preferably simple numerical experiments. It is further necessary to prevent overflow of the computer memory, to ensure the prescribed accuracy of calculations, and to maintain stability of the digital closed loop. The transfer functions of integrators are most easily simulated by way of a Z-transformation. With this model, the microcomputer can calculate deviations of velocity and acceleration with transient periods and stabilization time not exceeding limits determined by the bandwidth. The simulation program is suitable for applications such as controlling automatic manipulators of industrial robots, controlling electromagnetic suspensions of HSGT vehicles, and controlling various electric drives. On the next generation "Elektronika-81B" microcomputer such a simulation will be realized much faster, with a response time not exceeding 1 ms. Figures 7; references 4: 2 Russian, 2 Western (1 in Russian translation).
[52-2415]

FUNCTIONAL CHARACTERISTICS OF PYRAMIDAL FREQUENCY SYNTHESIZERS AND METHODS OF DESIGNING SUCH DEVICES

Kiev IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 8, Aug 84 (manuscript received 18 Feb 83) pp 44-47

YAMPURIN, N. P.

[Abstract] Pyramidal frequency synthesizers operate faster than any other, but all their various existing types are more difficult to build and cost more. The feasibility of building frequency synthesizers with more easily producible SAW filters is now considered, from the standpoint of tradeoff between advantages and deficiencies of pyramidal structures. The functional characteristics of a symmetric pyramidal structure are evaluated, to be specific, each of its L stages consisting of $K_{1,j}$ frequency dividers and $M_{1,j}$ mixers with filters. Calculations are made by a special method of successive approximations, assuming a uniform and complete coverage of the output frequency grid. The conditions for construction of a synthesizer with an equidistant frequency grid are established, conditions which impose the constraints $N_{1,j} - \text{ent}(N_{1,j}) = 0$ and $A_{1,j} - N_{1,j}$ on the synthesizer parameters ($N_{1,j}$ - bases of internal comparators, $A_{1,j}$ - coverage factors) with the recurrence relation $A_{1,j} = A_{1-1,j-1} + N_{1-1,2j}(A_{1-1,2j} - 1)$ (1 - 3) and with

$N_{1,j} = A_{1,j}$ corresponding to full coverage without excess. The frequency ratios $q_{1,j}$ at the inputs of mixers are calculated in the zeroth approximation. The results reveal that separation of useful frequencies from combination frequencies requires fewer stages with fewer dividers, while better interference immunity requires more stages with more dividers. This problem can be resolved by selecting $f_{1,j} \neq f_{2,j}$ so that $q_{1,j} = 1/K^2$ in the first stage, which behaves like a series synthesizer with single divider and single mixer per section, lie within frequency bands free of combination-frequency interference. It can also be resolved by using different types of mixers, or by using in the last stage a phase-locked automatic frequency control loop which remains stable even at low ratios $q_{L,1}$. The synthesizer design procedure begins, accordingly, with selection of K as tradeoff between the number of stages and the number of reference frequencies. Pyramidal synthesizers are preferable to series synthesizers with only a few stages and with number of frequencies to be synthesized below 10^5 . Their design is finalized by the method of vector optimization. Figures 1; references 6: 5 Russian, 1 Western.
[58-2415]

MAGNETICS

UDC 621.318.3.027.2.013.001.24

CALCULATION OF GAP PERMEANCE AND ELECTROMAGNETIC TORQUE FOR VALVE ELECTROMAGNET

Moscow ELEKTROTEKHNIKA in Russian No 9, Sep 84 (manuscript received 15 Aug 83)
pp 61-63

BUGAYEV, G. A., candidate of technical sciences, VNIIR (possibly All-Union Scientific-Research Institute of Relay Design)

[Abstract] Because calculating the permeance of the air gap and then the electromagnetic torque for d.c. electromagnets with externally hinged armature is very difficult, because of the highly intricate magnetic field distribution, an approximate procedure has been proposed by G. V. Mogilevskiy (ELEKTRICHESTVO, No 12, 1956) which combines general theoretical relations with specific corrective relations fitting experimental data. Now two methods of simplifying this procedure without loss of accuracy are proposed. One method involves replacing formulas for correction factors with graphs, which is convenient for "manual" calculations but not suitable for a computer. The second method involves representing correction factors in the form of power series in an armature-valve rotation angle, which facilitates the use of a computer or microcalculator. Figures 3; references: 2 Russian. [64-2415]

UDC 621.375.13

STUDY OF FERROMAGNETIC MATERIALS BY METHOD OF MAGNETIC CORRELATION ANALYSIS

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 27, No 8, Aug 84 (manuscript received 2 Dec 83) pp 3-9

GRUSKA, KAREL, candidate of technical sciences, docent, Department of Theoretical and Experimental Electrical Engineering, and VRBA, KAMIL, candidate of technical sciences, docent, Department of Telecommunication, Higher Technical School, Brno/CZECHOSLOVAKIA

[Abstract] The behavior of ferromagnetic materials in harmonically alternating fields is analyzed on the basis of their hysteresis loop, taking

into account nonsinusoidal variation of either the magnetic induction $B(t)$ or the magnetic field intensity $H(t)$ in time. The waveform of the magnetizing current is represented as a Fourier series with odd components only and the hysteresis loop is regarded as the plane projection of the magnetization curve drawn around a circular cylinder. The arguments of terms in the Fourier series for $H(t)$ are reduced to $k\cos^{-1}B/B_{\max}$ so that the series can be transformed into a Chebyshev polynomial which yields two principal dimensions of the hysteresis loop: width (coercive force) and elongation (saturation field intensity). A digital amplitude-phase spectrum analyzer is proposed for testing, measurement, and evaluation. It consists of a synchronizer, an address generator, two read-only memories, one for sine functions and one for cosine functions, two adders, and input device with attenuator and amplifier, a correlator, a counter, and a computer. The measuring circuit is connected to a separate generator. This analyzer can resolve signals with fundamental-component frequencies within the 10-100 Hz range. Figures 4; references 9: 2 Russian, 6 Czechoslovak (in Russian translation), 1 East German, [58-2415]

UDC: 538.56:539.12

FIELDS AND RADIATION OF 'TRUE' AND CURRENT MAGNETIC DIPOLES LOCATED IN MEDIUM

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 27, No 7, Jul 84 (manuscript received 2 Jan 84) pp 852-872

GINZBURG, V. L., Physics Institute imeni P. N. Lebedev, USSR Academy of Sciences

[Abstract] The behavior of "true" and current magnetic dipoles is compared in a medium with a specified dielectric permittivity ϵ and magnetic permeability μ . A "true" dipole is defined as one formed by two magnetic monopoles with different signs; a current dipole is a miniature current-carrying loop, or permanent magnet. Vavilov-Cherenkov radiated energy is examined for point magnetic dipoles of both types, as well as for electrical dipoles. True and current magnetic dipoles are found to create different sets of fields because of different polarization of the medium within the dipoles. If the medium within the dipoles moves along with the dipoles, the difference between "true" and current dipoles disappears, meaning that the difference between the two types of dipoles is caused by the passage of the medium through the dipoles. The difference between the effective fields and macroscopic fields for point dipoles is discussed. It is found that there is no general solution to the problem of the fields and radiation of point dipoles in a medium which depends solely upon the permittivity and magnetic permeability of the medium. The authors thank M. A. Miller, I. M. Frank, and V. N. Tsytovich for discussion of difficult problems. References 30: 6 Russian, 4 Western (1 in Russian translation). [47-6900]

AVERAGE MAGNETIC CHARACTERISTICS OF INDUSTRIAL MAGNETICALLY HARD ALLOYS

Moscow ELEKTROTEKHNIKA in Russian No 8, Aug 84 (manuscript received 28 Apr 83)
pp 42-44

GRIDNEV, A. I., candidate of technical sciences, TYURIN, V. M., engineer, and SKOTARENKO, N. G., engineer. KB PM (possibly: Design Office for Permanent Magnets)

[Abstract] Three magnetic characteristics of five industrial aluminum-nickel-cobalt alloys, all magnetically hard materials, were measured on $15 \times 15 \times 25 \text{ mm}^3$ large specimens (ingot dimensions allowing for machining after casting) and subsequently statistically averaged. These characteristics, essential to establishment of engineering design and performance specifications based on the demagnetization curve, are remanence, coercive force, and maximum energy products. The alloys thus evaluated are YuNDK15 (equivalent to Alnico 12/4), YuN14DK24 (equivalent to Alnico 44/6), YuN14DK25BA (equivalent to Alnico 52/6), YuNDK34T5 (equivalent to Alnico 38/11), and YuNDK35T5AA. The first three alloys were found to have an equiaxial structure, the fourth alloy was found to have a columnar structure, and the last alloy was found to form single crystals. Figures 1; tables 4; references: 8 Russian.
[51-2415]

UDC 621.372.8.049.75:621.372.814

SYNTHESIS OF OPTIMUM SMOOTH TRANSITION IN MICROSTRIP TROUGH LINE ON
MICROWAVE INTEGRATED CIRCUIT

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84
(manuscript received 8 Feb 83) pp 1617-1619

YASHIN, A. A. and CHOBAN, Ya. M.

[Abstract] A problem in designing microstrip trough lines as transmission lines for microwave hybrid-film integrated circuits is the synthesis of the optimum smooth widening of the center conductor on the dielectric substrate. Such a transition is described by the relation $c(z) = \phi[b(z)]Z_0(z) = \text{const}$

or, more explicitly $c(z) = \phi[b(z)]C_1(z) = \text{const}$ (z - longitudinal coordinate,

l - length, $2b$ - width of center conductor, $2c$ - clearance between outer conductors, Z_0 - wave impedance, C_1 - capacitance per unit length). It can be accurately synthesized according to the single-mode T-approximation of the electrodynamic process, on the basis of quasi-steady solutions to the corresponding singular integral equations and with conformal mapping. This is demonstrated by calculations made for a typical trough line as well as for a coplanar one. Figures 2; references 11: 8 Russian, 3 Western (1 in Russian translation concerned with foreign radio electronics).
[57-2415]

4TH ALL-UNION SEMINAR ON HIGH-FREQUENCY RELATIVISTIC ELECTRONICS (CONCLUSION)

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 27, No 7, Jul 84 pp 851, 872, 879, 912, 947

NUSINOVICH, G. S.

[Abstract] This article reviews the 4TH All-Union Seminar on High Frequency Relativistic Electronics held at Moscow University 24-26 January 1984. The main current problems of relativistic microelectronics are the following:

1) improving the power profile of relativistic microwave devices, i.e., increasing their power, pulse length and pulse repetition frequency; 2) increasing the frequency of the coherent or quasi-coherent radiation generated; 3) expanding the area of application of relativistic microwave devices; and 4) specific problems including the electrooptics of relativistic electron beams, the formation and diffusion of cathode and collector plasmas, and controllable cathodes. Experiments aimed at increasing output power and pulse length are described. Work being done to increase the output frequency of relativistic microwave devices is reviewed. Numerous reports on theoretical research are mentioned: on free-electron lasers, optimizing the parameters of O-type relativistic microwave devices, and the possibility of development of highly selective spatially developed electronic systems emitting unsteady multi-mode and multi-wave processes in high-power relativistic microwave oscillators.
[47-6900]

UDC: 621.372.822.001

PARTIAL-REGION METHOD FOR DIFFRACTION PROBLEMS WITH NON-COORDINATE BOUNDARIES

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 27, No 7, Jul 84 (manuscript received 15 Oct 82; in finished version, 16 Jan 84) pp 919-924

VESELOV, G. I. and TEMNOV, V. M., Moscow Institute of Electronic Engineering

[Abstract] An approach is presented for solving a class of noncoordinate problems of electrodynamics containing slanting interface boundaries in a rectangular waveguide. The Sommerfeld-Watson transformation is used to construct the field in an irregular region. The results of a numerical experiment are cited, showing good convergence of the solutions. The method can be extended to vector noncoordinate problems of electrodynamics containing non-rectangular waveguide sections, slanting interface boundaries, etc. Figures 3; tables 1; references 9: 8 Russian, 1 Western (in Russian translation).
[47-6900]

MILLIMETER-WAVE RANGE MASERS (A REVIEW)

Kiev IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 27, No 7, Jul 84 (manuscript received 27 Dec 83) pp 815-851

CHERPAK, N. T., Institute of Radio Physics and Electronics, UkSSR Academy of Sciences

[Abstract] Work on traveling-wave millimeter-wave range masers done primarily in the 1970's by independent researchers in the USSR, Sweden and the US is reviewed. The areas of research covered include the discovery and investigation of active substances, the development of electrodynamic systems to support the interaction between the active substance and microwave fields, providing stable amplification conditions, the development of other functional components, mainly pumping sources, and the investigation of major characteristics. The current status of maser physics and engineering and their prospects for development are outlined. The author thanks V. B. Shteynshleyger for discussion of all the problems as a whole in the process of preparing the review. The author is grateful to A. G. Kislyakov for a number of comments, which contributed to the elimination of inaccuracies and to a more definite statement of certain conclusions of the review, and he also takes the opportunity to thank all the coauthors of their work, the material of which in one or another degree are reflected in the review. Figures 16; tables 4; references 148: 83 Russian, 65 English.
[47-6900]

EFFECT OF SPACE-CHARGE FIELD ON OUTPUT CHARACTERISTICS OF O-TYPE OSCILLATORS WITH DISTRIBUTED INTERACTION

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84 (manuscript received 22 Dec 82) pp 1571-1579

VAVRIV, D. M., TRET'YAKOV, O. A. and SHMAT'KO, A. A.

[Abstract] The effect of a space-charge-field in a plane electron beam on the performance of an O-type oscillator with a long interaction space is analyzed by the V. A. Solntsev combination of two independent but equivalent methods: Green function of the Poisson equation and Fourier series in the time domain. An electron beam of finite cross section is considered, with the end effects at both entrance to and exit from the interaction space disregarded. A polyharmonic description of the electron motion takes into account depression of the force field and shielding by resonator mirrors. The steady-state performance is calculated for uniform and Gaussian electron beams, namely the dependence of oscillation amplitude, electronic efficiency and electron frequency shift on the fundamental-mode space-charge parameter,

also the dependence of efficiency on the beam current or, more precisely, the ratio of beam current or, more precisely, the ratio of beam current to minimum starting current. The results indicate that in both linear and nonlinear operating modes an increase of the space-charge parameter shifts the generation peak toward larger initial beam-wave asynchronism, while the efficiency reaches saturation at a larger beam current in the presence than in the absence of a space-charge field. Analysis of transients and application of the energy conservation law reveal that initially all energy is expended on generating and building up oscillations until at a certain amplitude energy begins to be extracted from the beam, first increasingly more up to a maximum and then monotonically less while the oscillation amplitude reaches its saturation level. An increase of the space-charge parameter results in a decrease of the difference between steady-state and initial electron frequency shifts. Evidently, therefore, the presence of a space-charge field increases the oscillator output power. Figures 6; references: 12 Russian. [57-2415]

UDC 621.373.82

INTEGRATED OPTICAL COMPONENTS UTILIZING ACOUSTOOPTIC AND ELECTROOPTIC DIFFRACTION IN MICRO-WAVEGUIDES

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 27, No 8, Aug 84 (manuscript received, after revision, 6 Jan 84) pp 9-16

VOZNESENSKIY, V. A., GASSANOV, L. G. and FELINSKIY, G. S.

[Abstract] The performance of integrated optics using microwaveguides with electrooptic and acoustooptic effects is analyzed on the basis of diffraction theory and experimental design data. The diffraction efficiency is calculated from truncated equations for coupled modes describing steady-state interaction of an incident wave and the wave diffracted by a surface acoustic wave, considering, specifically, Bragg diffraction of light. The resulting wave equation is solved either in the Wentzel-Kramers-Brillouin approximation or by piecewise-linear approximation. The result yields the dependence of diffraction efficiency on the voltage applied to the electrooptic phase grating. Theoretical data are correlated with experimental data on waveguides in Y-cut LiNbO_3 crystals with 35-50 nm thick titanium films (attenuation not exceeding 1 dB/cm, effective refractive index 2.3), these films having been deposited by thermal diffusion in an argon atmosphere at 970-1020°C. Phase gratings were formed by interdigital capacitor arrays, for operation as modulator. Measurements were made in the Raman-Nath diffraction mode as well as in the Bragg diffraction mode. Figures 6; references 24: 18 Russian (1 concerned with foreign radio electronics), 6 Western (2 in Russian translation). [58-2415]

UDC 621.313.333.001.2

STATE OF ART AND TRENDS IN DESIGN OF FRACTIONAL-kW INDUCTION MOTORS WITH
SOLID-IRON ROTOR

Moscow ELEKTROTEKHNIKA in Russian No 8, Aug 84 (manuscript received 14 Nov 83)
pp 2-4

ALIKHANYAN, K. A., candidate of technical sciences, Scientific-Research
Institute of Electrical Machine Construction

[Abstract] Induction motors with 60-550 W ratings are now built in the standard 4A (4AAM) series with three diameter sizes (50, 56, 63 mm) for either general-purpose or special-purpose use. Special-purpose applications include nonstandard line voltages and frequencies, extreme climatic conditions, operation in aggressive atmospheres, and severe operating requirements such as high slip or high starting torque. Two examples of applications calling for new concepts and special design are wire enameling equipment and movie film rewinders. Matching the motor and load characteristics is the essential objective, inertia and friction being most critical. In both applications an induction motor with solid-iron rotor has been found to perform better than a standard d.c. motor with voltage regulation or a conventional induction motor with squirrel-cage rotor and frequency regulation by means of thyristors. The special EAR series of motors developed for wire enameling equipment includes eight models: single-speed and two-speed 3-phase motors with 63 mm or 71 mm shaft height each, single-speed 3-phase gear motors with 90 mm or 112 mm shaft height, two-speed 3-phase gear motors with 160 mm shaft height, and 2-phase capacitor motors with 63 mm shaft height. They are all operating successfully for several years already in the "Kamkabel'" plant in Perm, where they drive "Sicme" (Italian-made) wire enameling sets. The special 4AMG series of motors has been developed for movie film rewinders. The design of both series is based on extensive theoretical and experimental studies of a solid-iron rotor and its properties and on economically as well as technological-ly optimum material selection. Rotors made of St3 carbon steel have been found to offer the best tradeoff. The next step in advancing the new type of induction motor will be production of rotors by sintering of metal powder with adequate control of magnetic permeability and electrical conductivity, with maximum possible standardization and with minimum possible waste of material. Sintered cupro-iron pseudosalloys with 3.5-40% Cu are under consideration as rotor material. Figures 5; references: 3 Russian. [51-2415]

IMPROVING VIBROACOUSTIC CHARACTERISTICS OF AXIAL FACE-TYPE INDUCTION MOTORS

Moscow ELEKTROTEKHNIKA in Russian No 8, Aug 84 (manuscript received 1 Dec 83)
pp 4-7

IGNATOV, V. A., doctor of technical sciences, professor, STAVINSKIY, A. A.,
engineers, and KHROMATOVA, N. P., engineer, All-Union Correspondence
Institute of Engineering Design

[Abstract] While stators of cylindrical induction motors vibrate principally in planes perpendicular to the shaft, when excited by electromagnetic unbalance forces or responding to nonuniformities of the air gap, stators of axial induction motors with rotor facing short stator often vibrate three-dimensionally. The vibroacoustic characteristics of both motor constructions are analyzed comparatively on the basis of the conventional fourth-order differential equation of motion for a ring. Natural frequencies and deflection modes are determined as functions of geometrical design parameters. From these relations are then, conversely, established the proportions necessary for minimizing the intensity of vibrations and attendant noise. Combining maximum utilization of active material with optimum energy and vibration characteristics is found to be attainable with conically tapered stator teeth and correspondingly short coil end turns. This is feasible in motors with six or more poles, while in motors with fewer poles this would require a large stator bore. Decreasing the mean diameter of active stator surfaces, at the air gap, and independently controlling the outside diameter of the stator (inside diameter of the yoke) for given numbers of poles is possible with either toroidal or short lap winding. A special bearing construction is necessary for a single-rotor motor and for a double-rotor motor with the stator between two identical rotor stacks. Such motors are preferable to conventional cylindrical induction motors as drives for special instruments and mechanisms. Figures 4; references: 6 Russian.
[51-2415]

RADIAL MECHANICAL VIBRATIONS OF BRUSHES IN ELECTRICAL MACHINES

Moscow ELEKTROTEKHNIKA in Russian No 8, Aug 84 (manuscript received 17 Oct 83)
pp 11-13

DRIDZO, M. L. (deceased), candidate of technical sciences, and GLEBOVA, I. Yu.,
engineer, VNIIEI (possibly: All-Union Scientific-Research Institute of
Electric Impulse Generators)

[Abstract] Radial vibrations of brushes in electrical machines, particularly commutator machines, are analyzed taking into account the friction between

brush and brush holder walls in a manner consistent with classical mechanics. Accordingly, the corresponding differential equation includes the experimentally established elliptical velocity dependence of the alternating friction force and the regressive linear dependence of its amplitude on its magnitude at constant velocity. Resonance conditions for the "brush-spring" subsystem without damping and with variable viscous damping by the contact film are evaluated on this basis, with the theoretically infinite brush displacement at resonance reduced to a finite one on the basis of assumptions reconciling theory with experimental data. Those data, on graphite and electrographite brushes tested with a short circuit around the commutator rotating at 3000 rpm, indicate that stiffness of such a brush in such a configuration is lower than its stiffness as a plain beam by a factor which depends on its dynamic modulus of elasticity. Approximation of the brush surface profile as a harmonically uneven one brings theoretical and experimental results still closer together so that brush design guidelines for minimum radial vibration can be established and brush performance can be more reliably calculated. Tables 1; references: 8 Russian. [51-2415]

UDC 621.3.017.31

CALCULATION OF BRAKING TORQUE IN MAGNETIC BEARING WITH CONDUCTING ROTOR

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA
in Russian No 8, Aug 84 (manuscript received, after completion, 23 Jan 84)
pp 82-86

KUVYKIN, VYACHESLAV IVANOVICH, engineer, Scientific-Research Institute of Applied Mathematics and Cybernetics, Gorkiy State University

[Abstract] The braking torque on a rotor in the field of an electromagnetic bearing is calculated, also taking account the braking torque produced by eddy currents in a rotor made of electrically conducting ferromagnetic material. As model is considered a cylindrical solid rotor with electrical conductivity σ and magnetic permeability μ spinning between two aligned identical axially periodic comb structures with current-carrying coils around their teeth. The magnetic field intensity in the rotor and the electromagnetic forces acting on the latter are calculated from the corresponding Helmholtz vector equation in cylindrical coordinates. The solution is sought in Bessel functions and the Maxwell stress tensor, whereupon the dependence is evaluated of the components of the braking torque vector on the electrical conductivity and on the magnetic permeability of the rotor material, also on the ratio of rotor radius to field penetration (skin-effect) depth in a rotor material with $\mu = 1$. As a numerical example is selected a rotor with a radius $R = 0.02$ m, $\mu = 1000$ and $\sigma = 1.667$ MS/m, at standstill and at 10,000 rpm. The author thanks O. D. Pozdeyev for formulation of the problem and the discussion of the results, as well as R. V. Lin'kov and N. V. Derendyayev for their interest in the work. Figures 3; tables 1; references: 6 Russian. [52-2415]

INTEGRATED UTILIZATION OF RENEWABLE ENERGY SOURCES

Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA in Russian No 10, Oct 84 (manuscript received 16 Apr 84) pp 3-10

DENISENKO, G. I., doctor of technical sciences, professor, corresponding member, Ukrainian SSR Academy of Sciences, Kiev Order of Lenin Polytechnical Institute imeni 50th Anniversary of Great October Socialist Revolution

[Abstract] The integrated utilization of renewable energy sources in order to smooth out production schedules and to provide reliable energy supply for consumers is examined. The general principles by which energy from renewable sources is converted into heat and electricity are examined. Central heat and power plants based on renewable energy sources are described. The major shortcoming of renewable sources - their power variability depending upon the season and time of day - can be overcome to a great extent by employing them in an integrated fashion, developing central heat in power plants or power systems for different regions of the country utilizing nontraditional types of energy, and combining them with existing power systems. Figures 4; references: 2 Russian.
[59-6900]

UDC: 621.311.031

EFFECT OF COMBINING POWER SYSTEMS WITH DIFFERENT CONSUMER OPERATING CONDITIONS

Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA in Russian No 10, Oct 84 (manuscript received 2 Mar 83) pp 42-45

KHODZHAYEV, M. N., candidate of technical sciences, All-Union Scientific-Research Institute KTEP (expansion unknown), with GOSPLAN, USSR

[Abstract] A method is presented for assessing the feasibility of combining power systems serving groups of consumers with differing consumption schedules and conditions. Formulas are derived for the combined steady-state power produced by combined energy systems, and for the difference in the steady-state power with the same systems operating in isolation and in parallel. The effect of combining two energy systems with differing load schedules is calculated as an example. Savings are achieved by combining systems in which consumers have different operating conditions by equalizing the load, reducing the number of equipment starts and stops and saving fuel. Figures 1; tables 1; references: 3 Russian.
[59-6900]

ANALYSIS OF ELECTRODYNAMIC FORCES ACTING ON MULTILAYER CRYORESISTIVE INDUCTOR

Moscow ELEKTROTEKHNIKA in Russian No 9, Sep 84 (manuscript received 14 Jul 83)
pp 51-54

KUBALDIN, A. B., candidate of technical sciences, and DZHAPAROVA, R. K.,
engineer, Moscow Institute of Power Engineering

[Abstract] Inductors wound with ribbon conductors of 99.999% pure aluminum and cooled with liquid neon (27 K) are considered to be most economical for large cryogenic induction heaters with a power rating of 5 MW or higher at industrial frequency (50 Hz). For the design of such inductors one must evaluate the electrodynamic forces and, on this basis, optimize the structure from this standpoint of allowable mechanical stresses relative to either the yield strength or the tensile strength, whichever calls for a larger safety factor. Numerical analysis and calculations are more difficult for multi-layer inductor windings than for less efficient single-layer ones, the most expedient method being discretization of both the inductor structure and its electric loading into mathematically manageable elements. The longitudinal distributions of the axial force and of the radial force are different, neither of them depends on the number of layers but the magnitudes of both forces do. The radial force, moreover, consists of two components proportional respectively to the radial gradients of mutual inductance and self-inductance. Algorithms have been constructed for calculation of both forces, revealing that the axial force and stress are largest at both ends of the coaxial layers while the radial force and stress are largest at the center of the innermost layer. The algorithms were used for optimizing 50 kA inductors wound with 0.3-0.5 mm thick aluminum ribbon. Figures 4; references: 3 Russian. [64-2415]

MEASURING STATIC LOAD ON DIRECT-CURRENT MOTOR WITH AID OF DYNAMIC MODEL

Moscow ELEKTROTEKHNIKA in Russian No 9, Sep 84
(manuscript received 28 Jul 84 [as given]) pp 54-55

KORNILOV, G. P., candidate of technical sciences, KARANDAYEV, A. S.,
engineer, and KAMAGAYEV, O. P., engineer, Magnitogorsk Institute of Mining
and Metallurgy

[Abstract] Automatic control of d.c. motors for electric drives in the metal industry requires fast and accurate sensing of the static load. This is done either directly by special devices such as electric or hydraulic dynamometers, or indirectly by transducers measuring other essential motor parameters such as voltage, current, and magnetic flux. The indirect method is preferable, because it is often more accurate and always less costly, and also because the life expectancy of transducers of electromagnetic quantities is much

longer. The operation of a flux transducer is based on the dynamic model of a d.c. motor under no load, with voltage and field current as input variables and magnetic flux as the output variable generating a signal proportional to it. The transducer is calibrated against a real motor and, without an external static load applied to the model, its output signal represents the dynamic load alone. The static load component is readily obtained by subtracting that dynamic component from the total load (current) reading. A performance evaluation of such a transducer, pertaining particularly to the accuracy of current subtraction, was made in a planned experiment using a continuous-duty d.c. motor for a hot-rolling mill with dependent two-zone speed regulation (armature control below nominal speed, field control above nominal speed) and subordinate control of three motor parameters (armature resistance and inductance, rotor inertia). The latter were varied by $\pm 10\%$ from nominal setting, in an accordingly $2^3 = 8$ -factorial experiment. A regression analysis of the results for acceleration under no load has revealed that accuracy of the inertia measurement and precise duplication of the magnetization curve are the two most critical items in correct setting of the model. Figures 3; tables 1; references: 1 Russian.

[64-2415]

UDC: 535.36

MATHEMATICAL MODELING OF TWO-FREQUENCY LASER SOUNDING OF SCATTERING MEDIA

Moscow ZHURNAL NAUCHNOY I PRIKLADNOY FOTOGRAFII I KINEMATOGRAFII in Russian Vol 29, No 5, Sep-Oct 84 (manuscript received 30 May 83) pp 343-348

BELINSKIY, A. V., Moscow Institute of Geodetic, Aerial Photography and Cartographic Engineers

[Abstract] A mathematical model of two-frequency pulsed laser sounding of optically transparent scattering media is developed. Allowance is made for nonlinear interaction of the radiation at two frequencies separated by an amount close to the Raman resonance frequency of the medium. A system of differential equations is cited that describes the interaction between pulses at the two different frequencies. The energy characteristics of the radiation resulting from elastic scattering of the Stokes radiation pulse are analyzed for the approximation of single scattering. Relationships are derived which connect the optical characteristics of the medium with the radiation flux at the entrance pupil of the receiving system and which can be used in developing methods for sounding scattering media. References: 1 Western (in Russian translation).

[63-6900]

UDC 531.715.1:621.373.826

GEOPHYSICAL LASER INTERFEROMETER WITH 12.5 METER BASE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 9, Aug 84 (manuscript received 22 Feb 83) pp 1638-1641

GORSHKOV, A. S. and DUBROV, M. N.

[Abstract] The long-base laser interferometer installed in 1978 in Garm (TaSSR) for geophysical observations during seismic activity includes a Lamb-stabilized LG-32 laser (wavelength 0.63 μm), a matching telescope, a light beam splitter with a pair of plane 45° mirrors behind, a protective straight light guide, and a reversing plane 90° mirror at the other end. The

base length, namely the distance between light splitter and reversing mirror, is 12.5 m and the path difference in this asymmetric Michelson interferometer is 25 m. The interference-type phase meter contains an acoustooptic modulator. This instrument recorded strains within the 0-1 Hz frequency range, as well as local earthquake during December 1978. A high-frequency stability for high accuracy of strain measurements requires decoupling the laser, increasing the diameter of the light guide, and decreasing the diameter of the light beam. The authors thank I. P. Ivanov and R. F. Matveyev for assistance in organizing and performing this study, as well as V. A. Aleshin for assistance in adjusting the equipment laboratory calibration of the interferometer. Figures 3; references 7: 6 Russian, 1 Western.
[57-2415]

UDC: 621.378

INVESTIGATION OF DYNAMICS OF RADIATION SPECTRUM OF INJECTION LASERS BY INFRARED IMPULSE FOURIER SPECTROSCOPY

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 27, No 9, Sep 84 (manuscript received 3 Oct 83) pp 90-92

AKIMOV, A. A., LOGGINOV, A. S. and SENATOROV, K. Ya.

[Abstract] An infrared pulsed Fourier spectroscopy method is developed for the experimental investigation of non-steady state processes in radiation which occur during pulsed pumping of injection lasers. The method can be employed for wavelengths exceeding 1.3 μm , where electrooptical chronography is impossible because of the unavailability of photocathodes with the appropriate 'red' boundary. Spectral dynamics are investigated experimentally by obtaining the autocorrelation function of the field using a Michelson interferometer, employing a high speed photodiode with high sensitivity at the emitted wavelengths, and employing a strobing device to investigate the temporal behavior of the process occurring in the spectrum. A diagram of the experimental set up is presented. It is found possible in principle to use infrared Fourier spectroscopy to study the dynamics of the radiation spectrum of an injection laser. The method is superior to others in that it can be used in the infrared region, as long as photodetectors are available which provide the needed speed. The proposed method is more sensitive than the standard approach employing a monochromator and strobed photodetector. Figures 3; references 6: 5 Russian, 1 Western.
[61-6900]

INVARIANCE OF PROBABILITY CHARACTERISTICS OF DETECTOR TO SHAPE OF OPTICAL PULSE SIGNALS

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian
Vol 27, No 9, Sep 84 (manuscript received 1 Nov 83) pp 62-64

RUMYANTSEV, K. Ye. and FIRSOV, V. S.

[Abstract] Four approximations of the description of the shape of optical signals at the receiving end of a laser system are analyzed: rectangular, sinusoidal, Rayleigh and normal. The parameters for the Rayleigh and normal approximations are based on 99.7% of the energy being concentrated in the interval $[0, T_1]$. A detector is analyzed in which the maximum value of the random process is extracted at the output of the photodetector in the observation interval and compared with a threshold. It is found that the probability characteristics of a detector for pulsed light signals depend upon the ratio of the signal and background radiation power, as well as their absolute values. As in the radio band, the probability characteristics of the detector are determined by the useful optical radiant energy, and are independent of the form of the signal when the bandwidth of the receiving/amplifying channel is optimum. The bandwidth, however, differs significantly from that recommended for the radio band, and depends upon the ratio of the power of the signal and background radiation. Figures 3; references 5: 4 Russian, 1 Western.

[61-6900]

UDC: 533.95

GENERATION OF LONGITUDINAL ACOUSTIC WAVES BY MODULATED HELICON WAVES

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian
Vol 27, No 7, Jul 84 (manuscript received 21 Dec 82; in finished version,
25 Nov 83) pp 897-902

VIGDORCHIK, N. Ye., Leningrad Technological Institute

[Abstract] Modulation processes occurring in metals and semiconductors in a strong magnetic field are investigated. It is shown that the modulation of an initial helicon wave of finite amplitude propagating in metals causes a change in the spectrum of the longitudinal acoustic wave. The propagation of nonlinear steady-state waves in metals is investigated; the possibility of solitary waves ("envelope solitons") existing in them is proved. References 10: 6 Russian, 4 Western (2 in Russian translation). [47-6900]

UDC 535:511

ACOUSTOOPTIC DEMODULATION OF FREQUENCY-MODULATED SIGNALS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84
(manuscript received 7 Feb 83) pp 1605-1609

VASIL'YEV, M. P.

[Abstract] Demodulation of frequency-modulated signals by means of an acoustooptic modulator is considered, with the diffraction law

$$\sin\theta = \frac{\lambda}{v}f$$

(θ - angle of light diffraction, λ - wavelength of light, v - velocity of sound, f - frequency of sound) as the basis of operation. A waveguide receives light from a monochromatic source through a collimator and sound through a piezoceramic converter array, with a sound absorber at the back end. The waveguide transmits modulated light through a cylindrical integrating lens to a multichannel photodetector array with a light spot from each channel projected on an opaque screen behind. The space-time distribution of a linearly

frequency modulated signal, calculated here for Raman-Nath diffraction by a sound wave in the optical aperture, corresponds to the electromagnetic field of the light wave in the focal plane of the integrating lens. Almost the total light energy remains within the first \pm pair of diffraction peaks, and there will be no overlap with higher-order peaks, when the frequency of sound waves in the center of the optical aperture is f_c

$$W + \frac{2}{T} \quad (W - \text{frequency})$$

deviation in the aperture, T - period of sound waves passage through the aperture) and the phase modulation factor is $\mu = kL\Delta n = 0.3$

$$(k = \frac{2\pi}{\lambda} - \text{optical})$$

wave number, L - length of light path in the waveguide, Δn - amplitude of variations of the refractive index in the waveguide). The demodulator sensitivity to changes in the luminous flux and thus to changes in the frequency during deflection of the light spots will be higher when the aperture in each channel is of a different size. Figures 3; references: 4 Russian (1 concerned with foreign radio electronics). [57-2415]

UDC 534:511

ACOUSTOOPTIC CELL AS SPACE-FREQUENCY FILTER

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84
(manuscript received 23 Nov 82) pp 1610-1616

BALAKSHIY, V. I.

[Abstract] With an acoustooptic cell regarded as a linear space-frequency filter, the feasibility of space filtration of optical signals by such a cell is examined from the standpoint of selective diffraction characteristics of the interaction medium. Diffraction of a space-modulated light wave by an elastic ultrasound wave with arbitrary spectral composition is considered, assuming a low diffraction efficiency. The optical radiation pattern of a cell with a birefringent medium is calculated in a general form applicable to monochromatic and polychromatic elastic sound waves, to isotropic and anisotropic interaction modes, and to Bragg as well as Raman-Nath diffraction modes. In the case of high diffraction efficiency such an acoustooptic cell is a linear filter only when harmonic ultrasound waves interact with light waves. The transfer function of a Bragg filter and the dependence of its bandwidth on the acoustic power indicate that such a filter becomes even more selective. Figures 5; references 7: 5 Russian, 2 Western (1 in Russian translation). [57-2415]

ACCURACY OF RANDOM SIGNAL SPECTRAL PARAMETER ESTIMATION AGAINST INTERFERENCE BACKGROUND IN ACOUSTOOPTICAL SPECTRUM ANALYZERS

Moscow RADIOTEKHNIKA in Russian No 9, Sep 84 (manuscript received 3 Nov 83)
pp 49-52

NAKHMANSO, G. S.

[Abstract] The use of photodetectors based on charge-coupled devices as optoelectronic transducers in acoustooptical spectrum analyzers is investigated. The structural diagram of an acoustooptical spectrum analyzer for parallel spectral analysis over a wide range of frequencies is presented. A formula is derived for the intensity distribution of the light field in the output focal plane of the lens of an ultrasonic light modulator operating in the Bragg diffraction mode. It is found that such devices can be used to estimate the spectral parameters of random signals with the required accuracy. Figures 3; references: 4 Russian.

[44-6900]

EXPERIMENTAL STUDY OF HIGH-STABILITY OSCILLATOR WITH SURFACE-ACOUSTIC-WAVE RESONATOR IN FEEDBACK LOOP

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 29, No 8, Aug 84
(manuscript received 4 Apr 83) pp 1641-1642

GULYAYEV, Yu. V., GRIGOR'YEVSKIY, V. I., KMITA, A. M., KUNDIN, A. P. and MAL'TSEV, O. A.

[Abstract] An oscillator with feedback through a surface-acoustic-wave resonator was built and tested for frequency stability. The resonator with two inputs contained an interdigital transducer array bare on one side and metallized on the other, inside the cavity between two reflecting structures separated by a distance of 201 acoustic half-wavelength on an ST-cut quartz substrate. The resonator has been designed for an operating frequency of 126 MHz and its performance, in terms of amplitude-frequency and phase-frequency characteristics is analogous to that of a volume-acoustic-wave quartz resonator. The short-time frequency stability of the oscillator, measured with a Ch3-34A instrument, was found to be within $5 \cdot 10^{-9}$ averaged over 1 s. Figures 2; references 6: 1 Russian, 5 Western.

[57-2415]

TRANSPORTATION

UDC 625.39:621.318.3

COMPUTER-AIDED DESIGN OF SPRING SUSPENSION FOR HIGH-SPEED GROUND-TRANSPORTATION VEHICLE

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA
in Russian No 8, Aug 84 (manuscript received 9 Jun 82) pp 31-35

MALAKHOV, VLADIMIR IVANOVICH, candidate of technical sciences, docent,
Moscow Institute of Railroad Transportation Engineers

[Abstract] A high-speed ground transportation vehicle with electrodynamic suspension also requires a mechanical spring mounting as an auxiliary means to ensure travel comfort throughout the entire speed range. A variant of a calculation procedure is proposed for computer-aided design of such a mounting. With mass of the loaded vehicle and its suspension parameters (clearance, levitation height, number and magnetomotive force of magnets) given, the problem is treated as one of design optimization to a single criterion: cost of magnets producing a levitation force equal to the weight of the vehicle. All geometrical dimensions are referred to the width of one suspending magnet, the magnetic Reynolds number is included as a dimensionless variable, and the roadbed is represented by an equivalent geometrical surface with some spectral roughness density. Vibrations of the vehicle are described in terms of dynamic stiffness, a quantity characterizing both the primary magnetic suspension and the secondary mechanical one. Calculations proceed in three stages. In the first stage are determined the number and the dimensions of magnets, typically of rectangular shape, optimum with respect to cost. In the second stage are determined the spring mounting parameters, optimum with respect to total allowable cost, on the basis of the Voigt two-mass elastoviscous model. In the case of excessive static deflection, a spring mounting will be replaced with a pneumatic one. In the third stage the results are analyzed for technical feasibility and, when necessary, the input data are corrected for reiteration of the procedure till technical feasibility becomes established. For illustration, design data are shown for a vehicle weighing 400 kN suspended on 16 magnets with an MMF of $2 \cdot 10^5$ A and traveling above a roadbed with a dispersion of surface roughness $S^2_{\lambda} = 5 \text{ mm}^2$ and 49 mm^2 respectively. Figures 2; references: 5 Russian.
[52-2415]

HEAT TRANSFER THROUGH AIR GAP BETWEEN INDUCTOR AND REACTION RAIL OF LINEAR INDUCTION MOTOR DRIVING HIGH-SPEED GROUND-TRANSPORTATION VEHICLE

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA
in Russian No 8, Aug 84 (manuscript received, after completion, 18 Mar 83)
pp 35-39

MINAYEV, BORIS NIKOLAYEVICH, candidate of technical sciences, docent, and
KONAKOV, YURIY PETROVICH, candidate of technical sciences, docent, Moscow
Institute of Railroad Transportation Engineers

[Abstract] Heat transfer from an inductor and from the reaction rail through the air gap in a single-sided or double-sided linear induction motor is analyzed, taking into account the velocity of air in the gap and considering that the reaction rail remains stationary while the inductor moves at the velocity of the vehicle. The velocity profile across the plane-parallel gap is assumed to be linear during laminar Couette flow and logarithmic except in the laminar sublayer during turbulent flow, while the temperature gradient is assumed to be uniform across the gap under all conditions of air flow. The heat transfer coefficient at the rail surface is calculated from the corresponding equation of heat balance with appropriate boundary conditions and for a uniform thermal flux density under the inductor. This coefficient is then generalized in the form of the Nusselt number and as such, upon dimensional analysis of experimental data, inserted into the semiempirical equation

$$\text{Nu}/\text{RePr} = \frac{0.0826\text{PrRe}^{0.885}}{0.775 + 11\text{Pr} + 2.510\lg(0.00254\text{Re}^{0.885}) + 333/\text{Re}^{0.885}} \quad (\text{Re} = \text{Reynolds}$$

number, Pr = Prandtl number). Figures 3; references 5: 4 Russian,
1 Western (in Russian translation).
[52-2415]

NEW ACTIVITIES, MISCELLANEOUS

UDC 615.478:621.3:612.17

PROBLEMS IN PRODUCING FOURTH GENERATION OF ELECTROCARDIOSTIMULATORS

Moscow ELEKTROTEKHNIKA in Russian No 9, Sep 84
(manuscript received 14 May 84) pp 57-58

ADAS'KO, V. I., candidate of technical sciences, OVNIEM (possibly Odessa All-Union Scientific Research Institute of Electromechanics)

[Abstract] The present third generation of "pacemakers" is characterized by small weight (39 g) and small size (20 cm³), long life (minimum 6 years), and high reliability. These devices operate with remote multiprogram control using highly interference-immune codes. Their construction is based on CMOS technology and large-scale integration. They are energized by LiI current sources or liquid Li/Ag₂CrO₄ cells. The major problem areas in further development of these devices are specific ones, namely power supplies and circuit topology, in addition to the general ones of higher production volume and lower production cost. For the fourth generation of "pacemakers" currently in development are considered radioisotope sources, since no new breakthroughs in electrochemical ones are anticipated, and discrete passive thin-film or thick-film devices on bilateral ceramic substrates. The "pacemakers" of the fifth generation should include single-chip microcomputers. Figures 2; references 3: 2 Russian, 1 CEMA.
[64-2415]

LITHUANIAN ACADEMY OF SCIENCES PHYSICS INSTITUTE: SIXTH ANNUAL SCIENTIFIC CONFERENCE

Vilnius LITOVSKIY FIZICHESKIY SBORNIK in Russian Vol 24, No 2, Feb 84
pp 116-126

[Abstract] Ten papers presented at the Sixth Annual Scientific Conference of the Physics Institute of the Latvian SSR Academy of Sciences held on 25 February, 1983 are summarized. The following papers were presented: 1) R.-M. V. Kanapenas. 'Problems of Development of Laser Mechanics and Technology'; 2) S. Alishauskas. 'Interrelation between Li Group

Representation Space and the Vigner-Rak Calculus'; 3) S. Ya. Kilin. 'Quantum Theory of Resonant Scattering of Laser Radiation'; 4) V. G. Gontis, Y. Y. Grudzinskas, R. S. Kiselyus, A. V. Kuplyauskene, Z. B. Rudzikas and V. I. Tutlis, 'Modeling of Atomic Processes in Tokamak Plasma'; 5) A.-S. P. Amulyavichyus, M. L. Balchyunene, D. I. Baltrunas, R. Yu. Davidonis, A. K. Dragunas, K. V. Makaryunas and S. V. Moteyunas. 'New Findings in Mossbauer Spectroscopy'; 6) B. I. Styro, N. V. Shpirkauskayte and N. V. Tarasyuk. 'Problems of Spontaneous Cleansing of Atmosphere of Radio Nuclides Above the Baltic Sea'; 7) P. Bal'kyavichyus, A. Dement'ev, Ye. Kosenko and E. Maldutis. 'Investigation of Wavefront Conjugation During Mandelstam-Brillouin Scattering of Focused Laser Beams'; 8) V. Kabelka, A. Milyauskas and Yu. Vishchakas. 'Influence of Heavy Atom on Nonradiating and Vibrational Relaxation in Anthracene Molecules'; 9) Z. Z. Vayshvila. 'Collective Effects in Rapidly Rotating Nuclei'; 10) L. Valkunas. 'Anomalous Polarization of Local Excitons and Mixing Effects in Molecular Crystals'. The purpose of the conference was to stimulate mutual interest and cooperation between different divisions of the Institute and to promote further improvement in the quality of studies performed. Figures 1; references accompanying individual papers--I. 15:12 Russian, 3 Western; II 2:1 Russian, 1 Western; III 3 Russian. [54-6900]

UDC 621.3:338.45

COST ACCOUNTING DURING PERIOD OF EXPERIMENTAL EVALUATION (EXPERIENCE IN MINSK ELECTRICAL EQUIPMENT MANUFACTURING PLANT IMENI V. I. KOZLOV)

Moscow ELEKTROTEKHNIKA in Russian No 9, Sep 84 pp 50-51

TROITSKAYA, T. B.

[Abstract] A large-scale experimental cost effectiveness evaluation was made at the Minsk Electrical Equipment Manufacturing Plant imeni V. I. Kozlov, for the purpose of establishing the optimum mode of cost accounting. This experience has confirmed that covering all plant subdivisions is most expedient. Accordingly, the principal technoeconomic indicators were defined and their normative levels established for each subdivision. On this basis production management procedures have been developed for maximum subdivision and overall cost effectiveness, essentially in terms of labor productivity and material economy. The data, based on full-capacity production, must be adjusted to actual 80% production levels in the Minsk plant as well as in parts suppliers' plants in Novolipetsk, Magnitogorsk, and Cherepovets. [64-2415]

CSO: 1860

- END -

END OF

FICHE

DATE FILMED

18 Jan 1985